CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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Skilled Artisans Prefer Standard Grade Tools

The skilled mechanic **must** have sharp files, otherwise he gets no satisfaction out of his work.

As soon as his file becomes dull tell him to turn it in and get a new one. The result will be better work and greater satisfaction to all concerned.

And it pays. New files cost little, labour costs much.

Good steel, accurate cutting and proper hardening insure long life to "Famous Five" files.

Specify them when ordering. They are:

KEARNEY & FOOT
GREAT WESTERN
AMERICAN
ARCADE
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MADE IN CANADA BY

NICHOLSON FILE CO.
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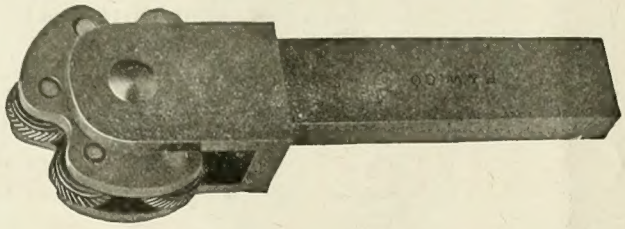
SMALL TOOLS

P. & W. Combination Lathe Knurling Tool

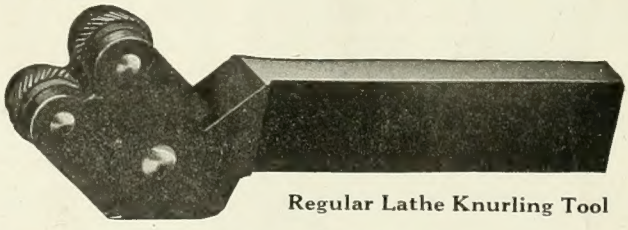


Combines Three Distinct Knurling Tools In One

You will save time by using this three-in-one Lathe Knurling Tool.

It carries three pitches of knurls fine, medium and coarse, as shown in sample. This does away with necessity of having three holders or of changing knurls where but one holder is available. Same knurls can be used in this holder as are used in our regular Lathe Knurling Tool.

FINE MEDIUM COARSE



Regular Lathe Knurling Tool

PROMPT SERVICE

is assured at our nearest store where P. & W. Small Tools are carried in stock. Place your order there to-day.

Precision Machine Tools---Standards & Gauges

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: DUNDAS, Ontario

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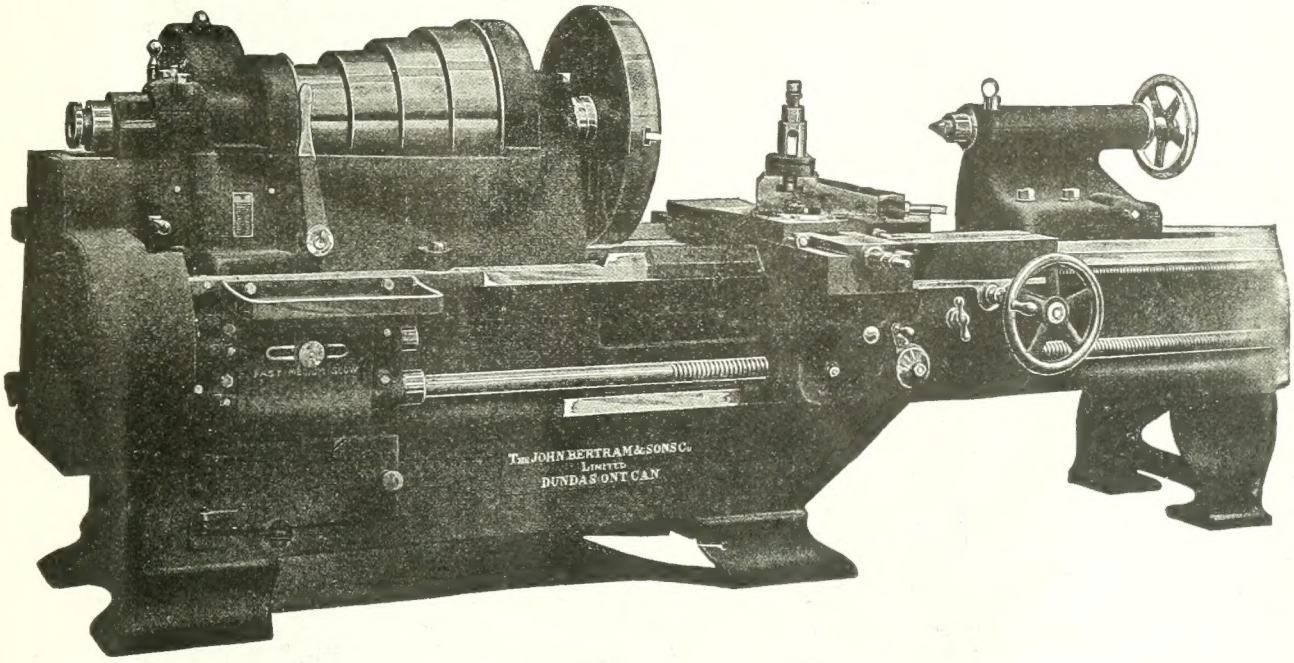
723 Drummond Bldg	1002 C.P.R. Bldg.	1205 McArthur Bldg.	Davidson Building	B.C. Equipment Co.

BERTRAM MACHINE TOOLS



Double Back Geared Gap Lathe

26-inch x 42-inch Swing

Bertram Machine Tools are built for safety and service, and are backed by a concern with sixty years' experience and the largest of its kind in Canada.

The John Bertram & Sons Co., Limited

Miscellaneous Department

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VANCOUVER
609 Bank of Ottawa Bldg.

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1205 McArthur Bldg.

HALIFAX
Davidson Bldg.

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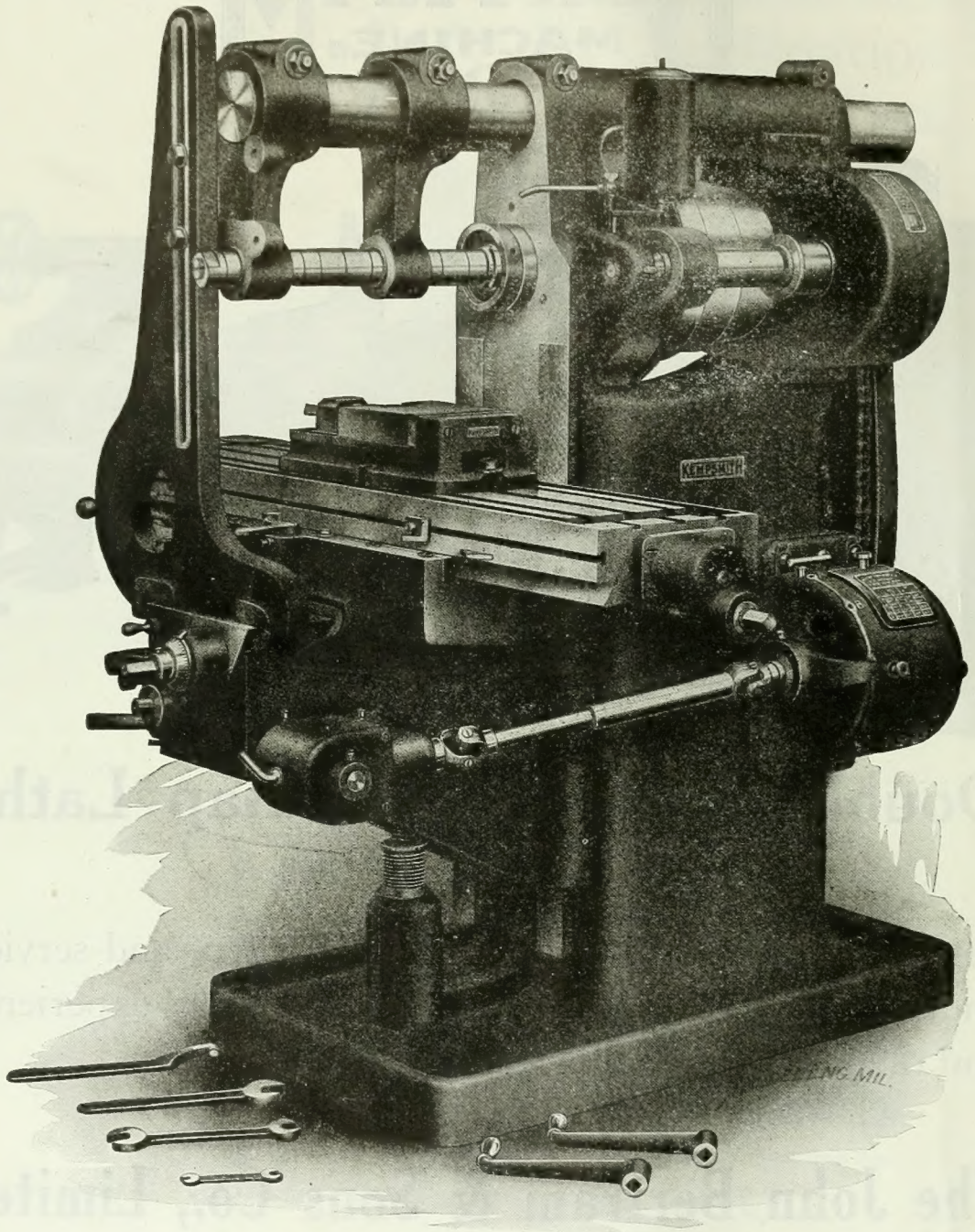
KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

Double Back Geared.

A heavy, powerful tool with double back gears and wide driving belt running on a three-step cone of large diameter. Our catalogue "B" describes and illustrates many notable features of the Kempsmith Milled. Write for a copy to-day.

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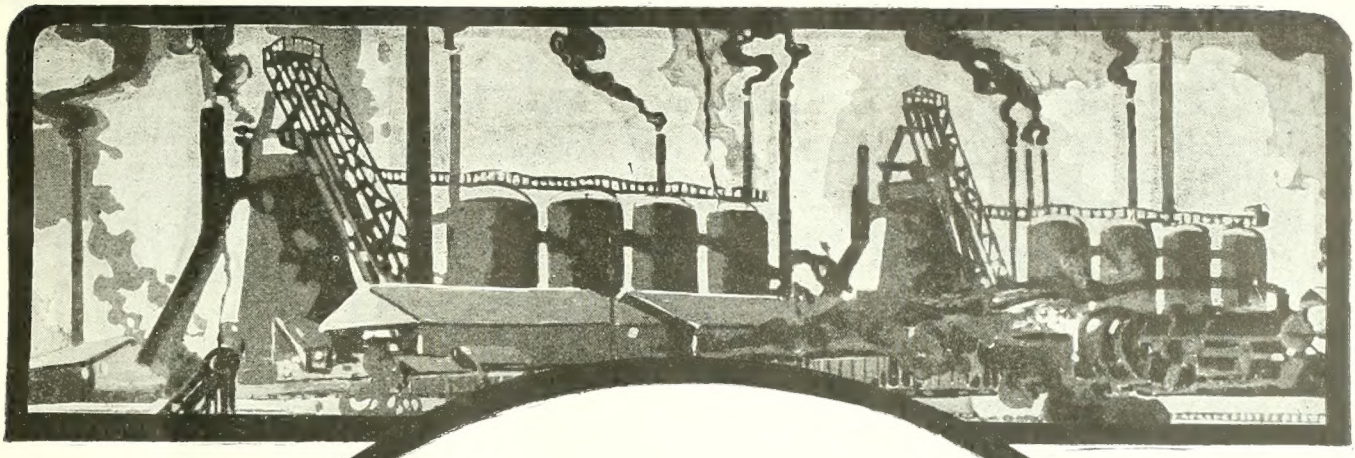

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Service

USE GOOD JUDGMENT

And contribute your share to the prosperity
of the Country in which you live.
Spend your money where you earn it.

PURCHASE THE PRODUCTS OF CANADIAN MILLS

A Canadian Dollar
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in Canada

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MARK OF ALGOMA O.H. QUALITY

SAULT STE. MARIE
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STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

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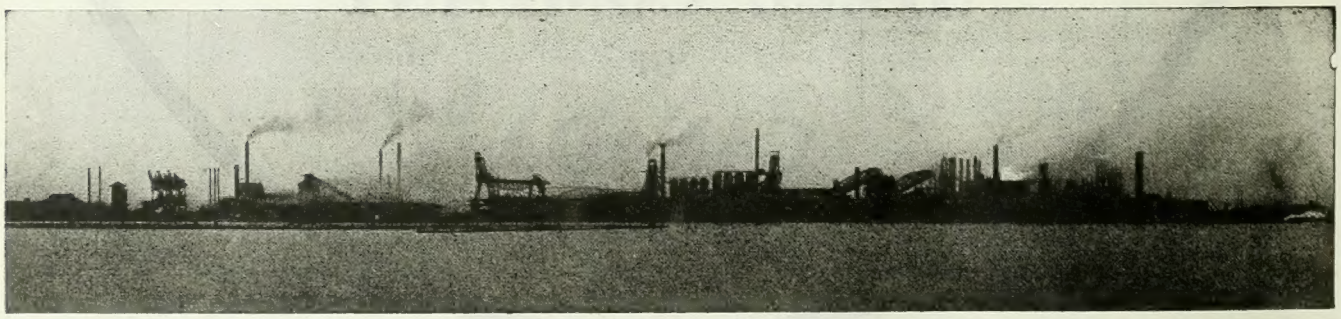
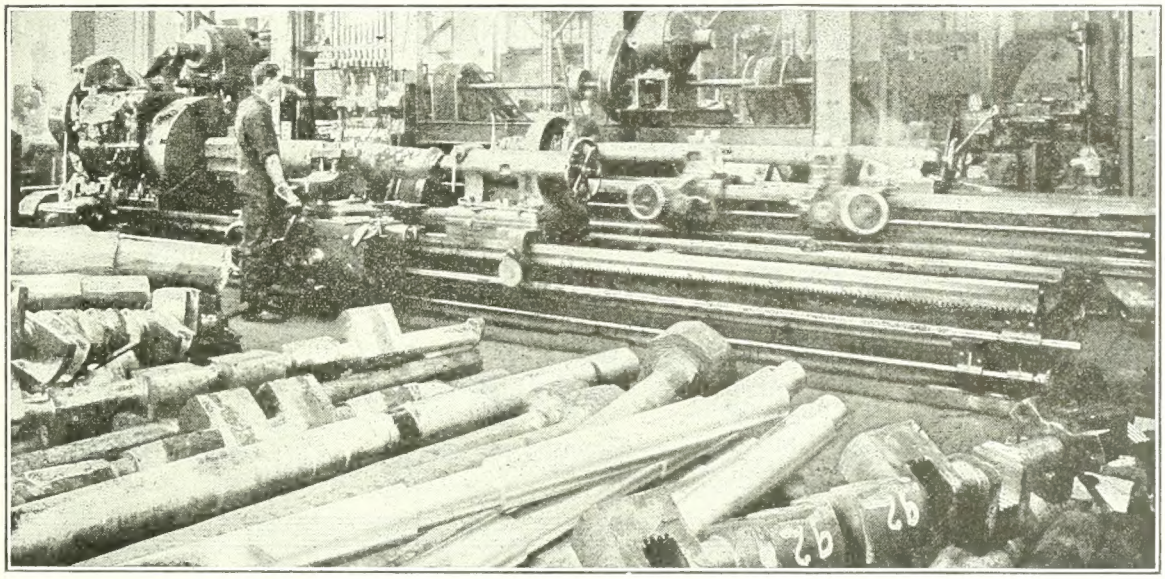


GENERAL VIEW OF THE PLANT OF THE ALGOMA STEEL CORPORATION FROM THE WATERFRONT

BRIDGEFORD

Heavy Duty Lathes



The above photograph shows a Bridgeford 27″ Manufacturing Lathe finish boring a cast-iron transmission housing for the new Fordson Tractor.

The diameter of housing is 19⅛″ and the limits of accuracy are .002″.

Maximum production is a requirement in the Ford plant and that is why a Bridgeford was selected to do the work. The Bridgeford turns out 80 pieces per day of 8 hours, which is excellent production.

There's a Bridgeford for every heavy duty lathe requirement. Bridgefords are in operation in all parts of the world on all kinds of duty. The line includes Heavy Geared Head Engine Lathes from 24″ to 72″ swing, Cone Driven Engine Lathes, Axle and Journal Truing Lathes and Manufacturing Lathes of 27″ and 30″ Swing.

Send for interesting data on Bridgeford Lathes.
We are in a position to make prompt deliveries.

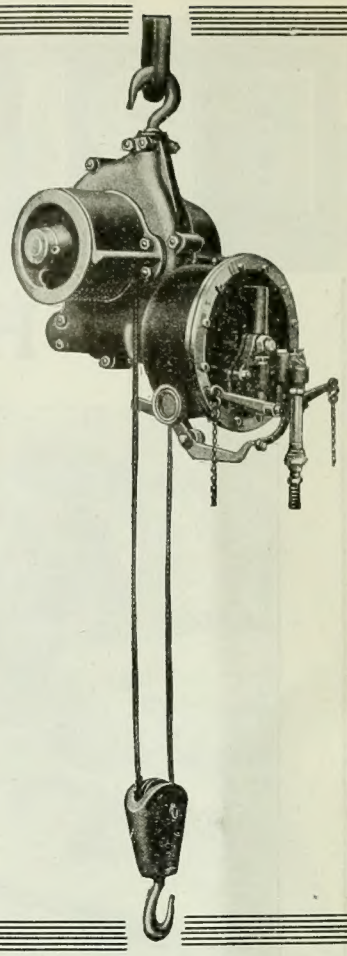
BRIDGEFORD MACHINE TOOL WORKS 161 Winton Road Rochester, N.Y.

Manufacturers of Heavy Duty Lathes for more than 20 years.

BRIDGEFORD

Less Overhead Expense

Whenever a strong, dependable hoist is needed, the "Imperial" air motor hoist fills the bill.



Few Parts Mean Less Trouble
The "Imperial" has few parts

The motor is completely balanced; the sensitive control allows the load to be raised or lowered a fraction of an inch at a time. Ball and roller bearings and thorough lubrication insure long wear.

Bulletin 8006 will interest you.

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High Grade STEEL Castings
Of Every Description

Prompt Deliveries

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WILT

HIGH SPEED AND CARBON
TWIST DRILLS
REAMERS AND MILLING CUTTERS

Quality First

The Keystone Upon Which All WILT Products Are Built

A high standard of perfection is maintained throughout the various processes of manufacturing WILT High Speed and Carbon Twist Drillls, Reamers and Milling Cutters. WILT products improve production! This is no theory, no untested statement, but an established fact backed by many of the largest manufacturers throughout Canada. For steady, reliable output of work that is satisfactory from the standpoint both of quantity and quality there is no better choice than WILT Products.

Put them to the Test

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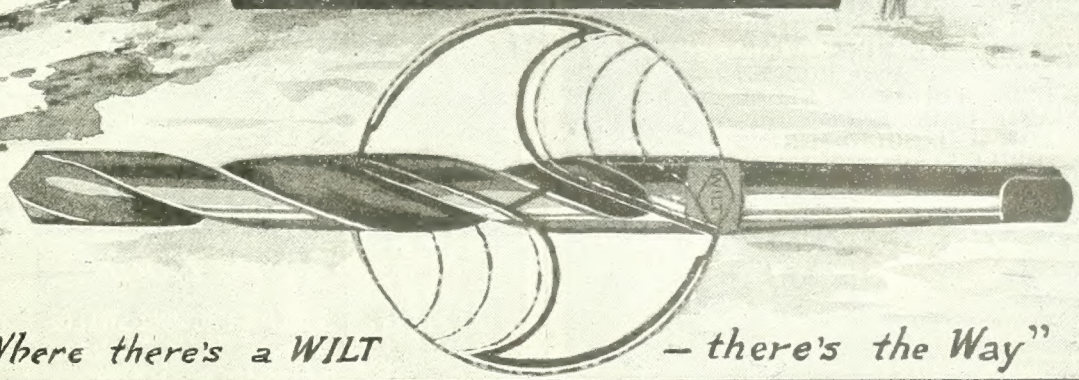
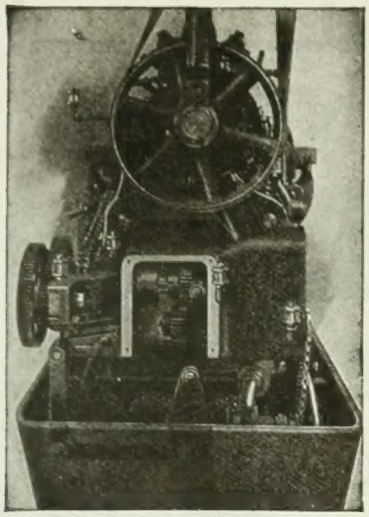
OF CANADA, LTD. WALKERVILLE, ONT.
London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England.



"Where there's a WILT — there's the Way"

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER, CONN.



Courtesy National Acme Co., Cleveland, Ohio.

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is subject to exceptional hard usage, but it gives unfailing service.

YOUR MACHINE

should be equipped with clutches that will give just such satisfaction.

What are your requirements? Let us know. We maintain an engineering force to work out all clutch installations. They will co-operate with you.

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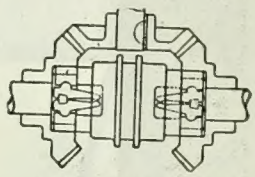

Double Clutch in Nest of Gears.

THE JOHNSON FRICTION CLUTCH

Swedish Steel & Importing Co., Limited

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Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock

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MADE IN THE U.S.A.

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A Keen Cutter

WOLFRAM *Is Both*

Strong in the Neck

VULCAN CRUCIBLE STEEL CO. ESTABLISHED 1900 Aliquippa Pa: U.S.A.

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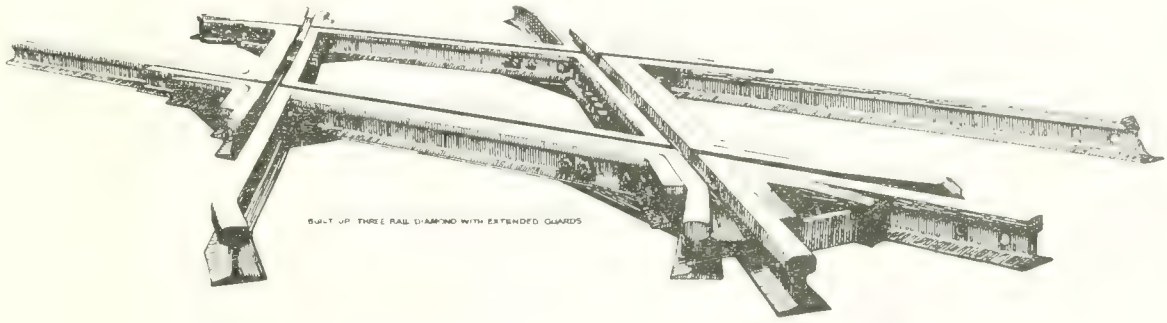
OF ALL KINDS FOR STEAM AND ELECTRIC RAILWAYS

Built-up, Hard-Centre and Solid Manganese-Steel

Manufacturers of Balkwill Articulated Cast Manganese Crossings



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Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.

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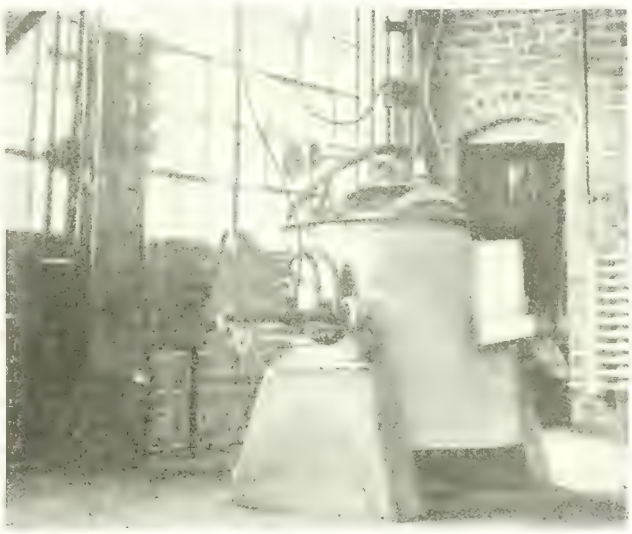

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Built in capacities from 100 lbs. to 6 gross tons

Melting and Refining Steel, Cast Iron, Ferro-Manganese, Copper, Nickel, Aluminum and various Non-ferrous Alloys.

Hamilton & Hansell, Inc.

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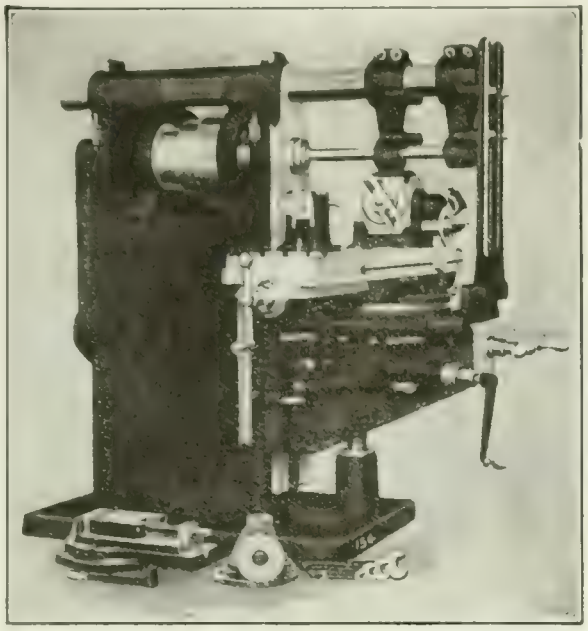

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The Miller of high-grade construction—fast, accurate and durable.

Adapted for Heavy Manufacturing or the most exacting tool room service. A suitable Range and Capacity for every class of milling.

The Ford-Smith Machine Co., Ltd.

Manufacturers of Milling Machines, Grinders, Disc Grinders, Polishers and Special Machinery

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Made by The Canadian Furnace Co.
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We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

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IMPERIAL GENUINE BABBITT METAL

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Made specially for all HIGH SPEED, HEAVY ENGINES and EXTRAORDINARY HARD WORK

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Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. **We can advise you** and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.

We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

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HIGH SPEED STEEL

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Tool Steel for Every Purpose

Twist Drills, Taps, Hack Saw Blades, Milling Cutters, Files, Etc.,
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We call to your particular attention that we make a specialty of and solicit your inquiries for

Circular Saws—for wood and for hot or cold metal cutting
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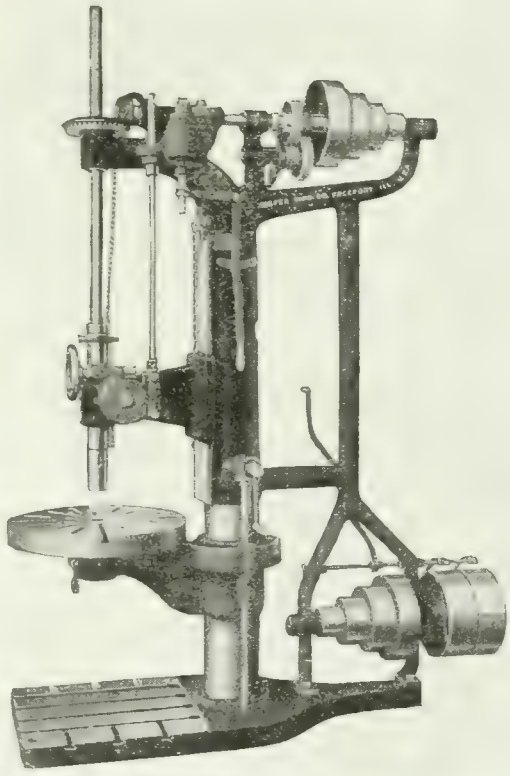
H. BOKER & CO., INC., 332 St. James St., Montreal, P.Q.

The Driller for Exact Work



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Enable Your Workmen to Eliminate Spoilage

The Hoefer Driller is pre-eminently the one to be found in the best plants. "It's almost as good as a Hoefer," so often heard in the machine and tool trade, indicates the position held by Hoefer Drillers.

Exact drilling, to the last thousandth of an inch, pays by eliminating spoiled material. Hoefer Drillers pay for themselves and increase the workman's pride in his work.

Twenty-five Years on Market

Twenty-five years making drillers has given Hoefer the "Know-how." The Hoefer Drillers are used by many of America's leading manufacturers. Equip your factory the Hoefer way. Take any kind of a drilling problem you have to the Hoefer Manufacturing Company, and the Company's experts can tell you how it was solved by other men, some of whom you may know.

Investigate now. Write to-day for catalog. The Hoefer engineers are at your service.

HOEFER MFG. CO.
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CANADA
FOUNDRIES & FORGINGS
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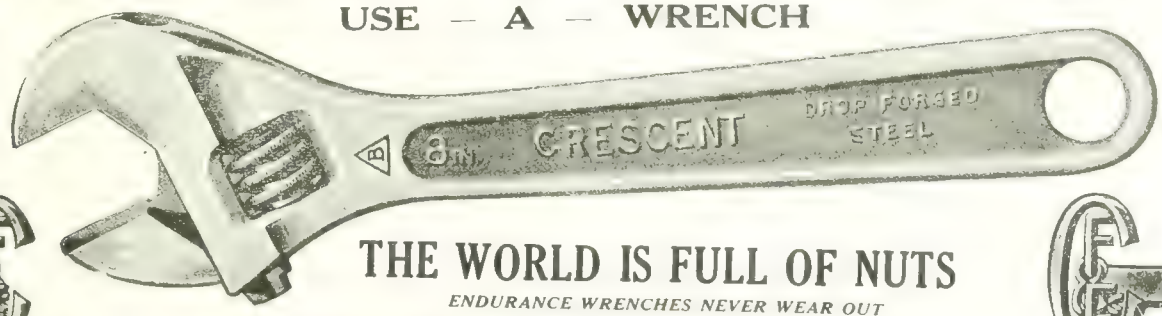
DON'T RATTLE

USE — A — WRENCH



THE WORLD IS FULL OF NUTS

ENDURANCE WRENCHES NEVER WEAR OUT

CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Crucible

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Open Hearth Steel

Tool Steel

"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.

1856

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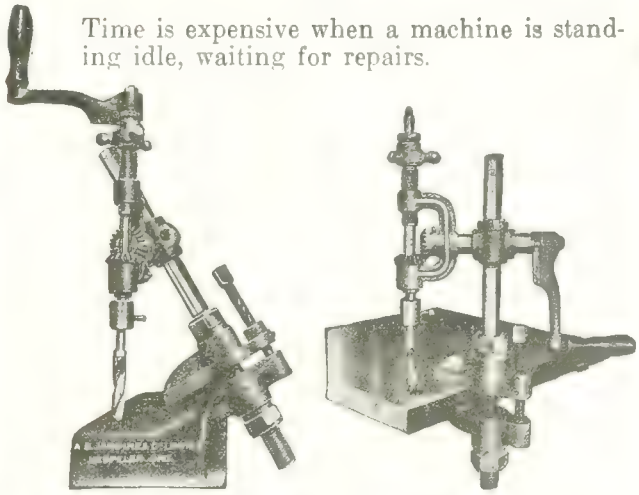
RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net

Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
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MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory."

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

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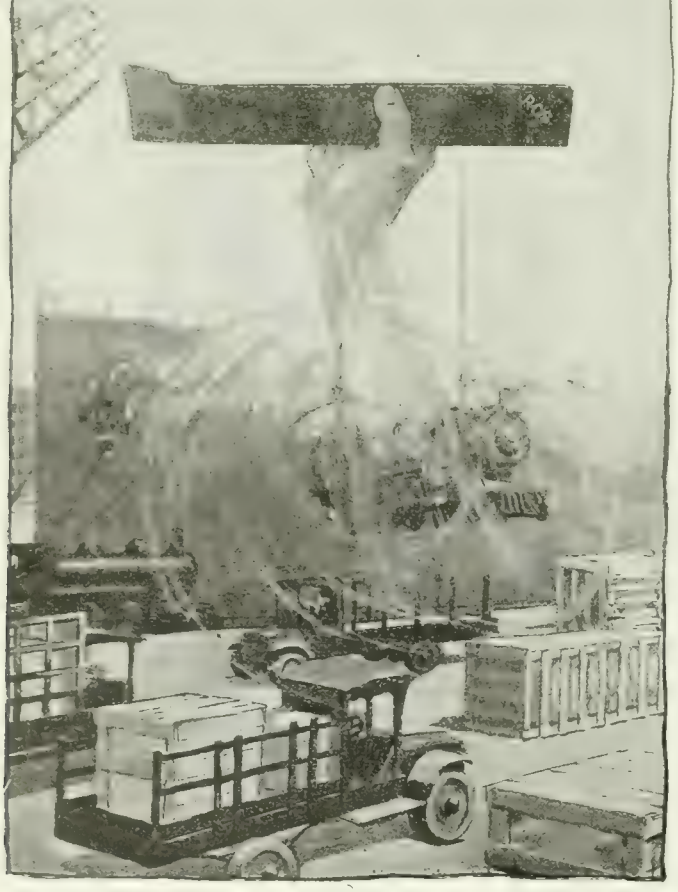
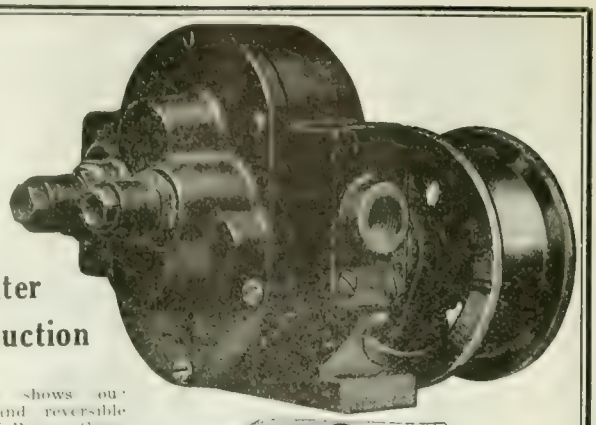


The Way To Greater Production



Catalog shows our plain and reversible types of Rotary Geared Lubricating Pumps. Now ready for delivery. WRITE

The Trahern

There's little or no wear to a pump operated at slow speed. A Trahern Pump operated at slow speed will flood your cutting tools with coulant. With Trahern Positive Drive all the lubricant needed is discharged with sufficient force to reach the cutting point of the deepest buried tool. Advantages peculiar to Trahern Rotary Geared Pumps!

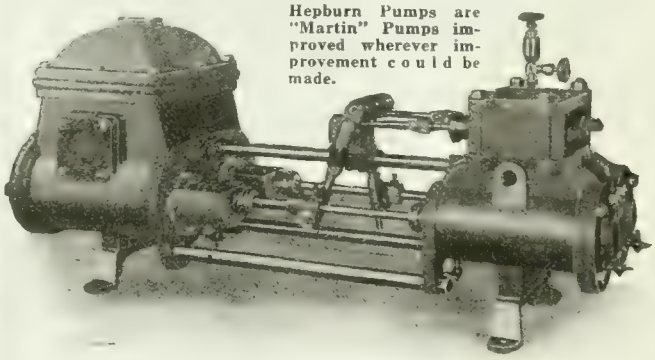
TRAHERN PUMP COMPANY, ROCKFORD ILLINOIS

Canadian Agents: A. R. Williams Co., Toronto

ROTARY GEARED PUMPS

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



Hepburn Pumps are "Martin" Pumps improved wherever improvement could be made.

JOHN T. HEPBURN, LIMITED

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POTTER & JOHNSTON

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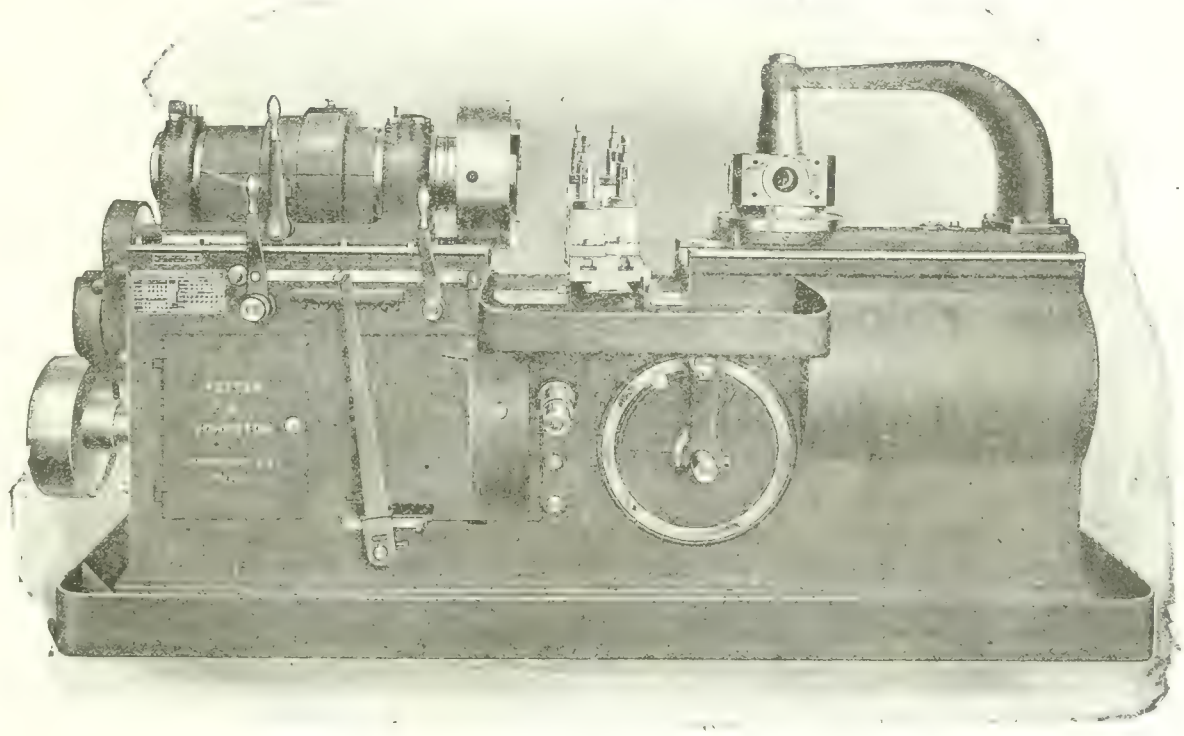
Increase the Output and Reduce the Cost



6-A Potter & Johnston Automatic Chucking and Turning Machine

6-A Potter & Johnston Automatic Chucking and Turning Machine

Geared head, having three automatic changes of spindle speeds.
Geared feed.
Auxiliary reaming and threading feed.
Cross slide.
Automatic back facer bar through spindle.
16-inch convertible two and three-jaw scroll chuck.
Spindle 5¾ inches diameter, hole 3½ inches diameter.

DO IT AUTOMATICALLY

All operations are entirely automatic. One attendant can readily run a battery of two to six machines.

In addition to automatically machining all varieties of castings from iron, bronze or steel, also forgings, the machines are also recommended and are widely used for finishing pieces from bar starch which have previously been cut off to length. This is a highly economical method of producing gear blanks, bushings, studs, etc.

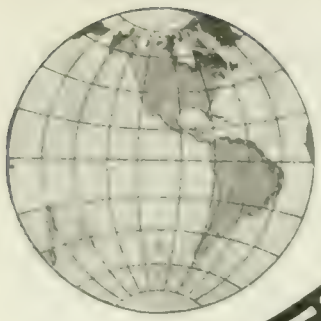
Catalog gives full particulars. ***Drop a card for it.***

Canadian Offices: POTTER & JOHNSTON MACHINE CO., Pawtucket, R.I.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada

Works and Warehouse: Galt, Ont., Canada

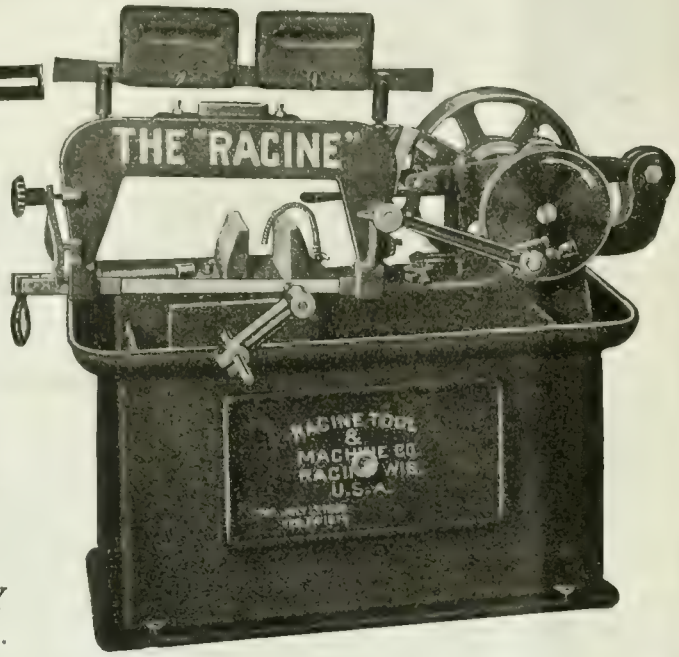


"THE RACINE"

High Speed Metal Cutting Machine

Standard the World Over

This is the only machine in the World that has an ABSOLUTELY POSITIVE AUTOMATIC LIFTING DEVICE, a feature secured by patents. Another feature is the rigid saw frame guide. These two assets combine to give long life to the cutting blades and save a lot of money.



"THE RACINE" minimizes wastage, cuts accurately and with great speed. Then they are easy and cheap to operate. These features are appreciated by the best shops everywhere and that's why "THE RACINE" sets the "Standard the World Over." Write for full particulars.

Use "RACINE" H.S. Tungsten-Power Blades.

RACINE TOOL & MACHINE COMPANY

Melbourne Ave. ∴ RACINE, WIS., U.S.A.

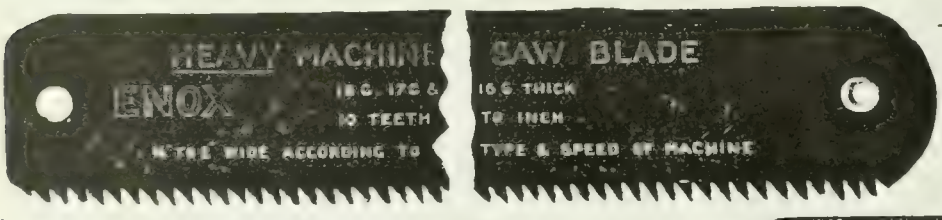
SIMONDS

HACK SAW BLADES

UNEQUALED IN QUALITY ANY SIZE OR LENGTH

Simonds Canada Saw Co. Limited

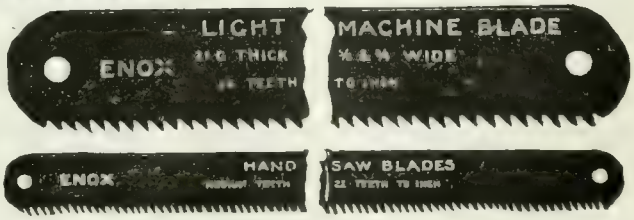
ST. JOHN MONTREAL VANCOUVER

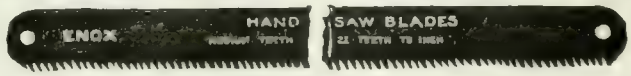


ENOX

Hacksaw Blades

ARE THE BEST





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AN ENTIRELY BRITISH COMPANY

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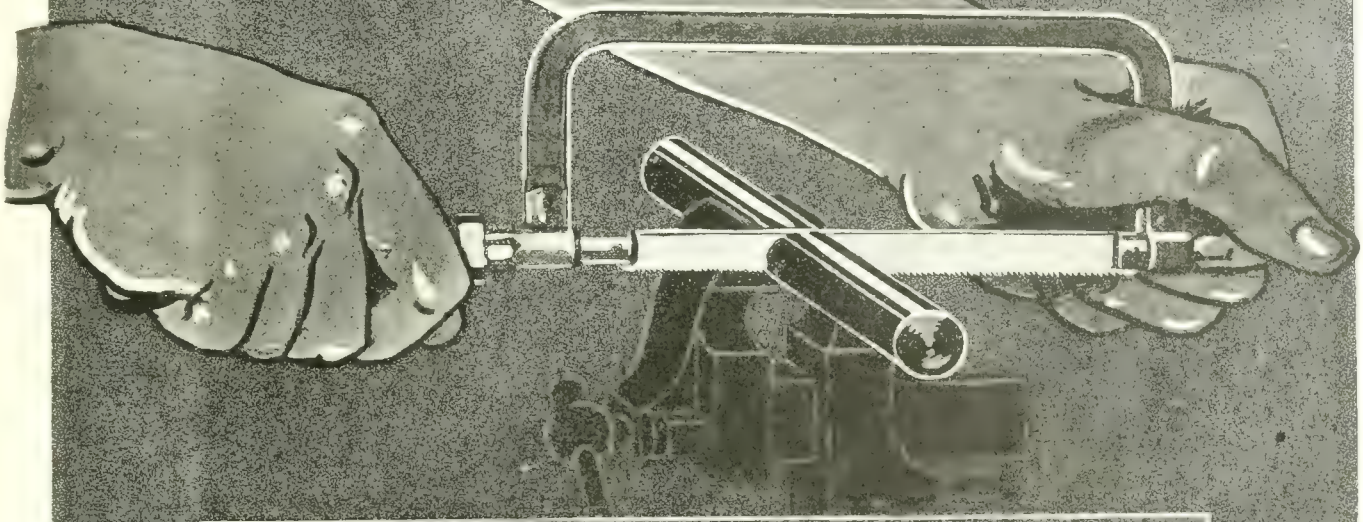
Agents for Canada, East of Fort William

THE STANDARD MACHINERY & SUPPLIES, LIMITED, 261 Notre Dame St. West, MONTREAL, QUE.

Agents for British Columbia—The A. R. Williams Machinery Co., Limited, 495 Railway St., Vancouver, B.C.

YOU CAN *FEEL* THE DIFFERENCE



Starrett Hack Saws

Cut with less effort. That's the point that appeals to the machinist. In hand-sawing he feels the difference in his arm. On a power saw the economy of the Starrett blades shows in the increased number of cuts per hour and cents per blade.

The combination of the Starrett Hack Saw Chart MA and Starrett Hack Saw Blades will reduce the cutting costs in any shop.

The L. S. Starrett Co., Athol, Mass.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

New York **London** **Chicago**

"WACO"

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TRADE MARKS

High Speed Steel

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

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RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

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We wanted something original—this is what we got

"BOTH in these operations and half another — I'll show you later — completed in the time our old taps took to do one; that, I guess, is why we continue to use your Victor Collapsible Taps."

It was the often-heard story of time saved, of costs lowered, of all threads clean and smooth. And it was pleasant to hear.

Victor Tool Company
Waynesboro, Pa.
U.S.A.

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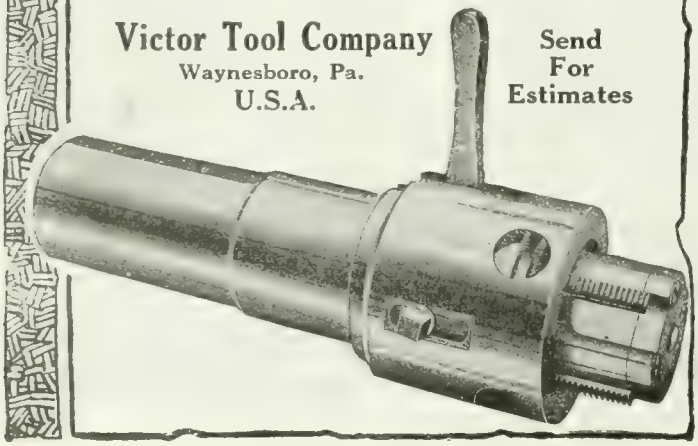
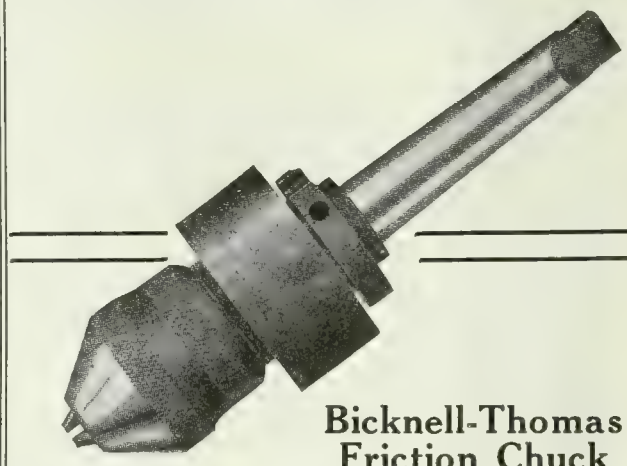




Bicknell-Thomas Friction Chuck

not only prevents tap breakage but saves loss due to damaged parts and removing taps. It is the simplest Tapping Chuck made; it is the most efficient and fits any kind of machine. It can be used on multiple spindle drills or tapping machines, even when they are close together.

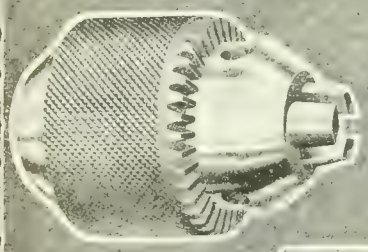
Try one out on us. Write to-day for illustrated Circular, describing same fully.

BICKNELL-THOMAS COMPANY
GREENFIELD, MASS., U.S.A.

Canadian Representative: The Jas. Buckley Co., St. Nicholas Bldg., Montreal, P.Q.

Jacobs IMPROVED DRILL CHUCK

World Famous



The secret of their success is no secret at all. It merely their Superiority

JACOBS MFG CO.
HARTFORD CONN.
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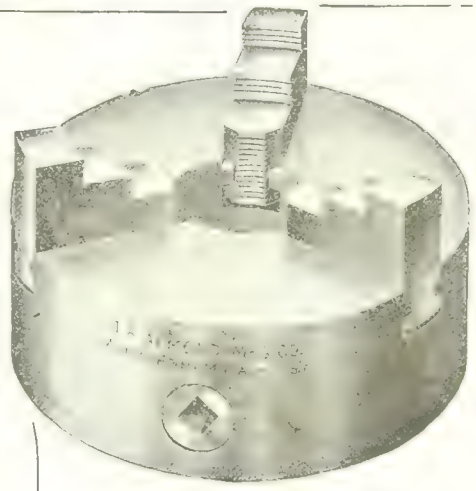
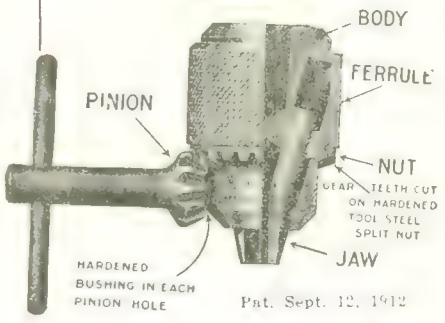
ALMOND CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5″, 6″, 7½″, 9 and 12″.



Geared Nut Drill Chucks, in various capacities, 0″ to 1″.



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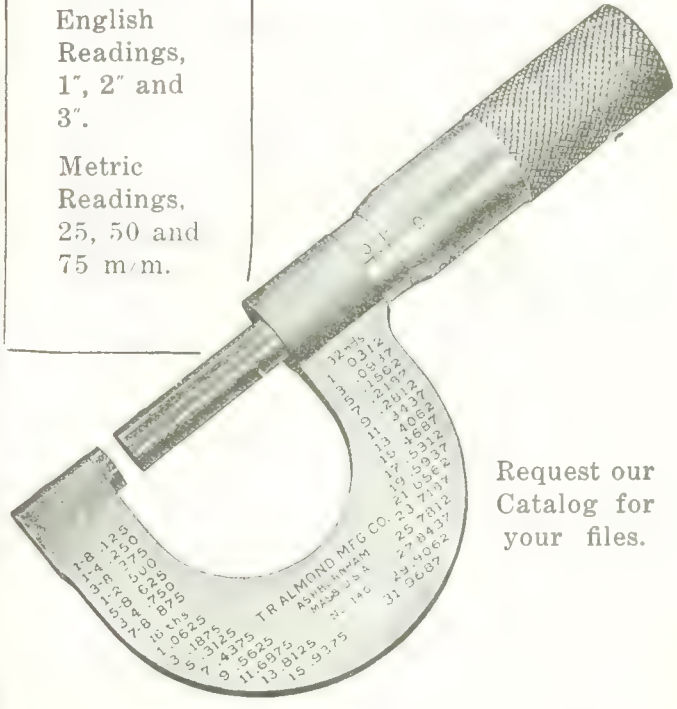
English Readings, 1″, 2″ and 3″.

Metric Readings, 25, 50 and 75 m/m.



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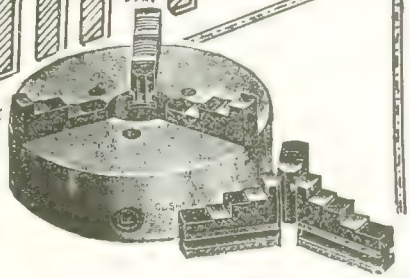
Cushman



The "Cushman" Chuck of to-day is the fruit of nearly sixty years of Chuck building

And right from the start in 1862, they have been known throughout the industry for their high quality Material and Workmanship.

The CUSHMAN Chuck of to-day embodies every up-to-date improvement of a long line of FAMOUS CHUCKS.

Send for our Catalogue showing complete line of Lathe Chucks, Drill Chucks and Portable Face Plate Jaws.

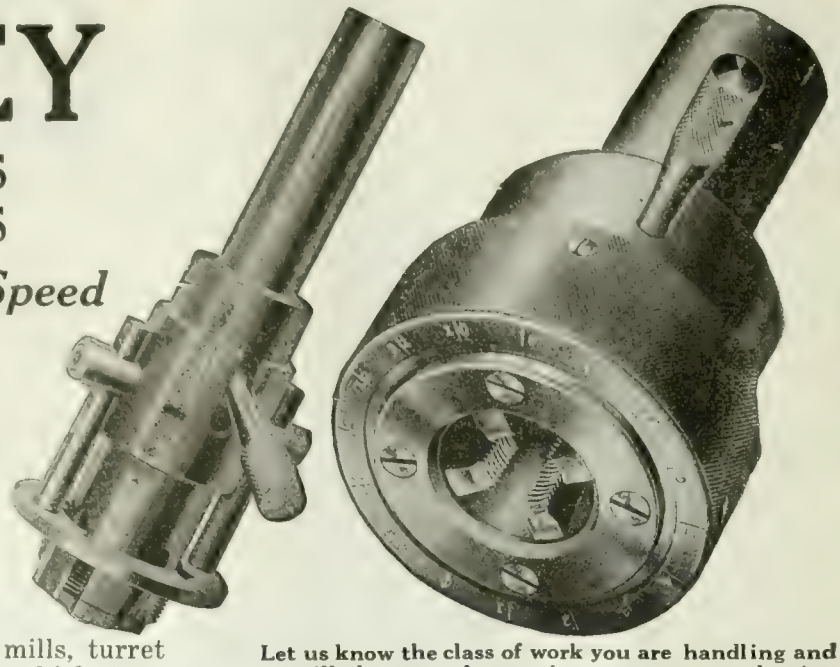
Cushman Chuck, Hartford, Co. Conn

CHUCKS

MURCHEY

COLLAPSING TAPS and SELF-OPENING DIES

Promote Accuracy and Speed



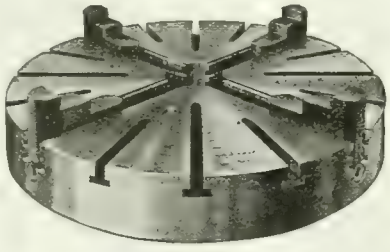
MURCHEY Collapsing Taps and Self-Opening Dies are cleared free from the thread instantly, preventing all danger of stripping, besides cutting time for production in half. **Thus you are sure of greater accuracy and greater production.** Murchey Tools are speeding production in all parts of the country on tapping machines, drill presses, monitor machines, boring mills, turret lathes, and all other machines to which taps or dies may be attached.

Let us know the class of work you are handling and we will show you how to increase your production 50 per cent. without running up the cost.

Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES & CO., 15 Rue Fenelon, Paris, France.

GOOD MECHANICS
Show preference for the
UNION INDEPENDENT CHUCK



It has an iron body, and is made heavy and strong. The double bearing ribs for the jaws make a stiffer chuck for heavy work than the ordinary single rib type.

The screws are also of the "socket" type and operate in hardened steel thrusts, which also add to the strength and stiffness of a chuck that is designed for **heavy duty.**

The jaws are wide and the screws are correspondingly large.

UNION MANUFACTURING CO.
New Britain, Conn.

New York Office - - 26 Cortlandt St.

Makers of a Complete Line of Chucks

H & G

Die Head Cuts
Perfect Threads

The H. & G. Die Head illustrated is only 3⅝" outside diameter, yet it will cut from the smallest up to 1" standard thread and up to 1⅛" fine threads. For absolute proof of its ability to stand up and give good results, see the perfect threads it cuts on nickel steel. You can see these many places, but in almost any automobile or aeroplane plant for certainty.

Made in 9/16", 1", 1½" and 2" sizes.

No stronger, more durable, more accurate Die Head was ever made.

on Nickel Steel

Ask for Catalog

Eastern Machine Screw Corp.

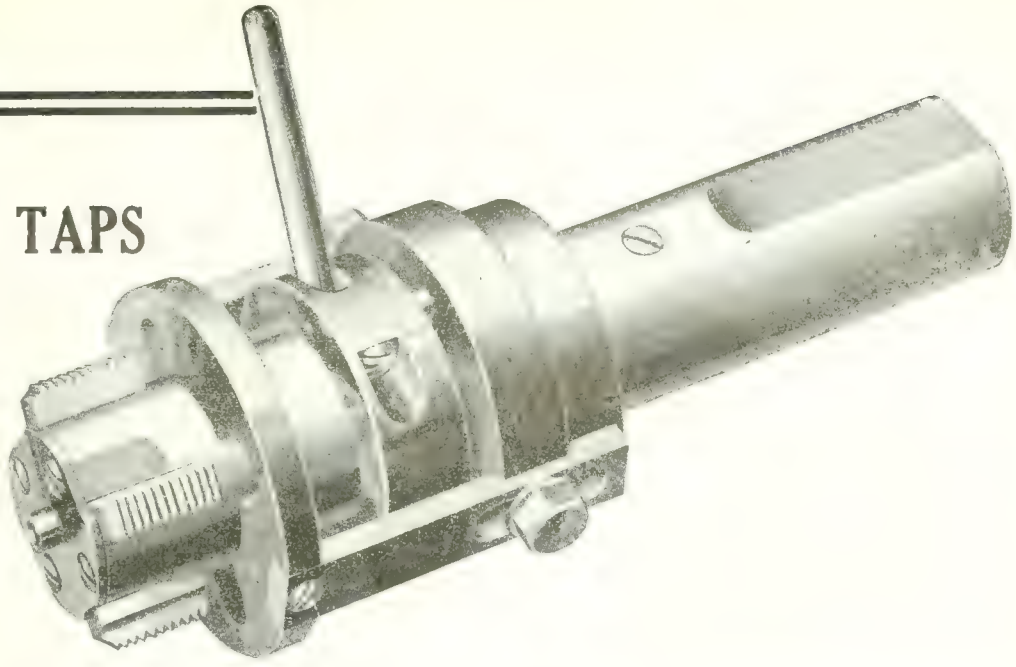
New Haven - Conn.

NAMCO COLLAPSING TAPS

AUTOMATIC

The simplicity of action and positive releasing of chasers from the finished threads are only part of the reasons for the continued successful use of NAMCO TAPS.

May we show you how they can meet **your** requirements?



ALSO

GRIDLEY AUTOMATICS
ACME AUTOMATICS
NAMCO COLLAPSING TAPS
„ SELF OPENING DIES
„ AUXILIARY SCREW MACHINES
„ SCREW MACHINE PRODUCTS

THE
NATIONAL ACME COMPANY

NEW ENGLAND PLANT WINDSOR, VT. CLEVELAND, OHIO CANADIAN SCREW PLANT MONTREAL, P. Q.

BRANCH OFFICES: NEW YORK BOSTON CHICAGO DETROIT ATLANTA SAN FRANCISCO
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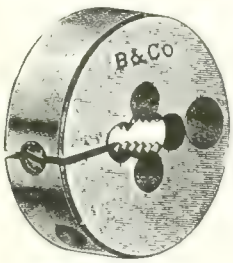
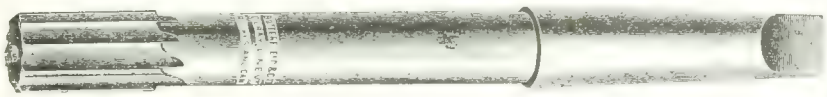
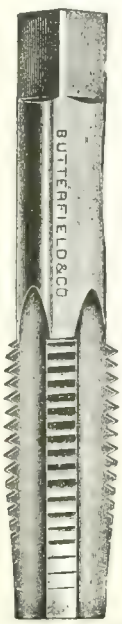
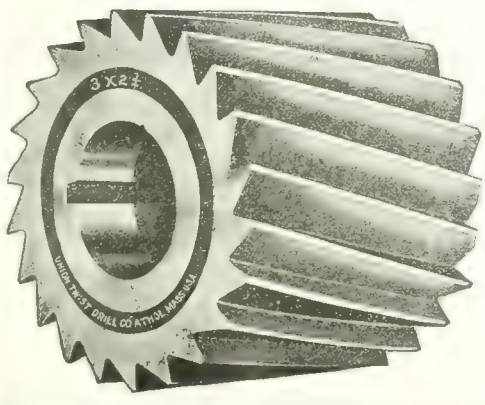
Makers of Gridley Single and Multiple-Spindle Automatics at Windsor, Vermont; and Acme Automatics, Threading Dies, Collapsing Taps and Screw Machine Products at Cleveland, Ohio





Butterfield Taps, Dies, Reamers Drills, Milling Cutters





Butterfield quality gives the Maximum returns on your investment.

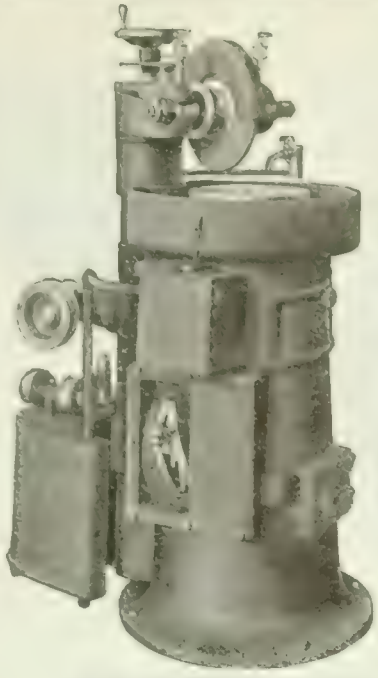
BECAUSE

It ensures **clean and accurate cuts** and will duplicate the work over a long period of use.
Butterfield Quality is the result of 35 years' continuous effort to keep our product distinctly in the lead from the standpoint of efficiency and economy.

SEND FOR OUR CATALOGUES. Catalogue Seventeen covers Taps, Dies and Reamers. Catalogue "A" covers our line of Twist Drills, Gear and Milling Cutters.

Butterfield & Co.
Inc., Rock Island, P.Q.

Toronto Office: 220 King Street West



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Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.

It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.

And it is built to last.

It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.

Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.

Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.

HOYT METALS

"Frost King"
"Trojan"
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BABBITTS

Hoyt Metals have been used with great success for many years.

Put them to the test and you'll soon see a difference in your babbitt cost.

All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.

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STEEL PLATE CONSTRUCTION

Oil Storage, Gasoline Tanks, Air Receivers, Pneumatic Water Supply Tanks, Smoke Stacks, Boiler Breeching, Riveted Steel Pipe, Bins and Hoppers. Heavy and light steel plate construction erected anywhere.

We invite your inquiry.

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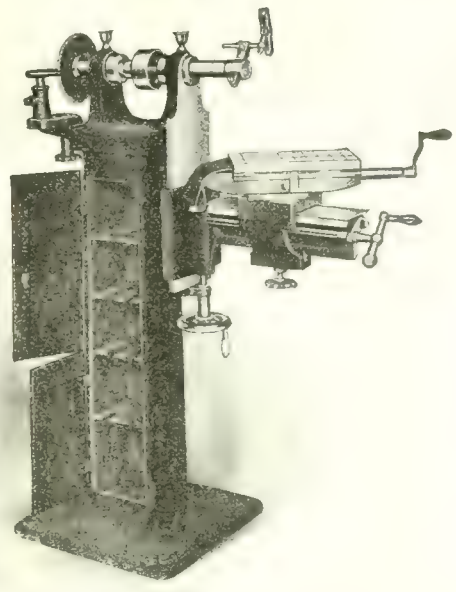
OBTAIN THE BEST RESULTS



GARVIN No. 3, Universal Cutter and Surface Grinder
Use Code—Banish

From Cutters and Tools Kept Sharp on

GARVIN No. 3 UNIVERSAL
CUTTER AND SURFACE GRINDERS

Simple **Light Running** **Accurate**

The spindle is hardened and ground and supported out close to the wheel by an extended bearing, and carefully protected from emery.

The knee and the yoke carried on the knee both have a large range of adjustment. On the knee yoke or carriage is mounted the swiveling table, which has a quick, sensitive movement by rack and pinion operated from end or side.

On this table is mounted the index head, and all the attachments are held in this head.

An outfit of emery wheels, mandrels, bushings, wrenches, etc., is supplied with the machine.

Machine is designed to keep its original factory accuracy.

CAPACITY: CUTTERS, 11" x 6"; SURFACES, 9½" x 6

For Further Information { ASK YOUR DEALER or WRITE US DIRECT

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THE GARVIN MACHINE COMPANY

Spring and Varick Streets ***(Visitors Welcome)*** **50 Years New York City**

One Customer Says:

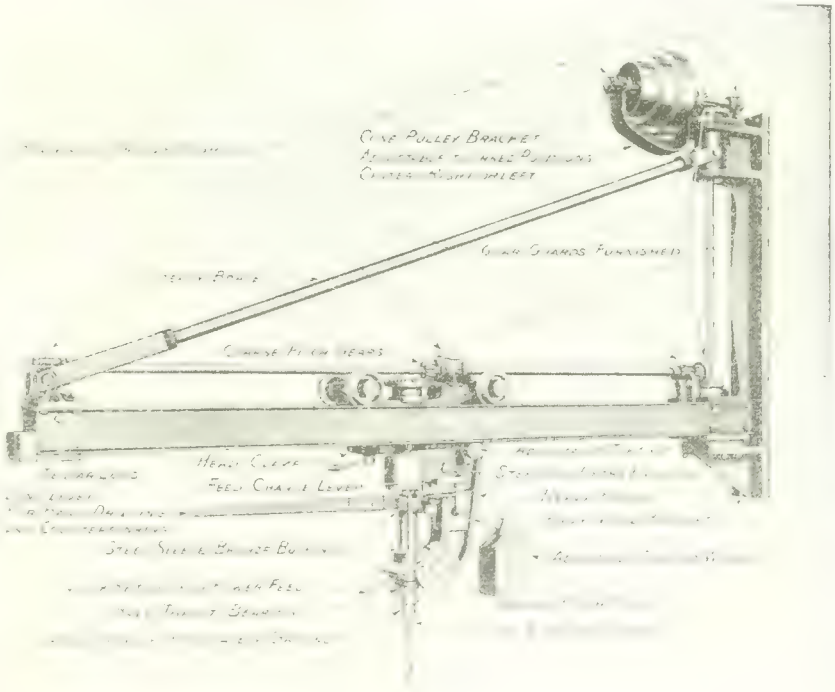
"These machines were put in operation immediately upon arrival, have been producing ten hours per day every day since, and we have never experienced a bit of trouble with same." We know you will appreciate what this means in any shop, and believe this is the sort of machine you are looking for. We consider the machine the finest in its line on the market to-day, and believe an installation would save money for you in the cost of your production.

Our illustrated bulletin will interest you, giving detailed information.

MADE IN FOUR STANDARD SIZES

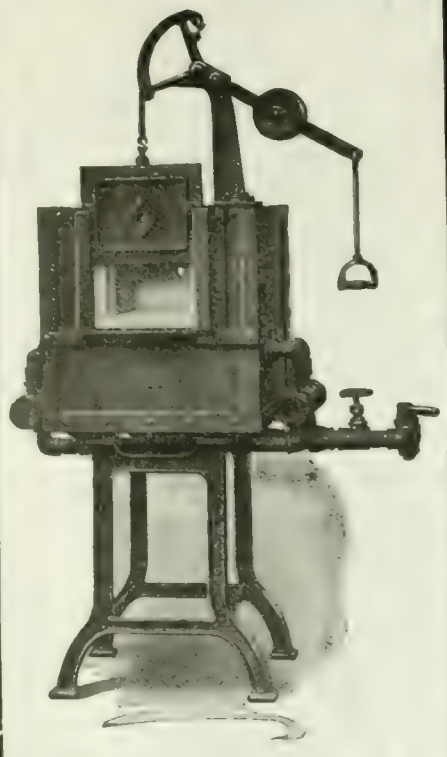
Rated size	Drills to center of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**



TYPE K HIGH SPEED STEEL FURNACE

The Right Furnace for High Speed Steel

Too much too little or an uneven heat treatment of High Speed Steel renders it practically worthless for the purpose intended.

This Gilbert & Barker furnace has been designed especially for the correct heat treatment of High Speed Steel. A temperature of 2400°F. is quickly obtained and **easily maintained.** The heat is uniform on all sides of the work and loss by radiation is reduced to the minimum by special insulation.

More than 50 years' experience in designing and building furnaces, especially for the accurate and economical heat treatment of metals is your guarantee of satisfaction.

PROMPT DELIVERY ON G. & B. FURNACES

Recent additions to our plant, already one of the largest in this field, makes it possible to offer immediate shipment of your order.

Tell us your problem and we will tell you the type of furnace you require, but first send for Bulletin 24. To-day is a better day than to-morrow--write.

Gilbert & Barker Mfg. Co.

West Springfield, Mass., U.S.A.

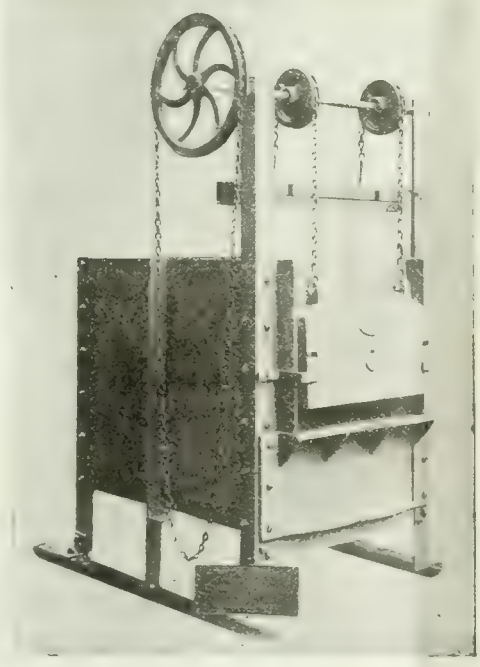
Canadian Agents: Williams & Wilson, Montreal, Que. New York Office, 26 Broadway.

Do These Advantages Appeal

To Your Sense of Economy and Efficiency?

OIL FURNACE
VERSUS
COAL FURNACE

It's economy — requires one-half the space; costs less than half; no chimneys or flues required; instantaneous and perfect control of temperature; higher temperature obtained; no coal ash handlers required; no coal or ash piles; less waste of fuel, because it is shut off instantly; requires much less time to get the required heat. *Can you afford to lose the Advantages of this oil Furnace?*



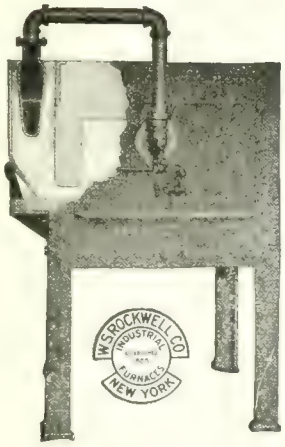
Write To-day for Full Particulars.

Mechanical Engineering Company,
LIMITED

Room 308, Bank of Toronto Building, Montreal

Three Rivers, Que., Can. **Cable Address: "*Mecol*"**

ECONOMIZER FORGE



It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into forge shop.

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Furnace Engineers and Contractors

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(Hudson Terminal Bldg.)

Canadian Representative: R. J. McLean
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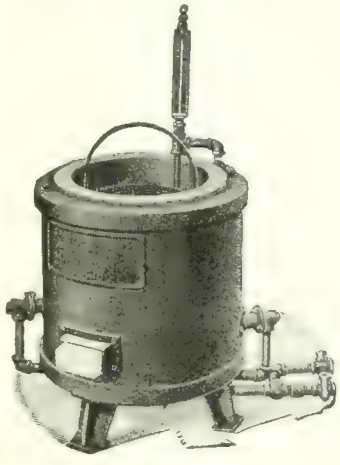
STANDARD FURNACES

OIL or GAS

Prompt delivery on all tool room types.



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Annealing
Carbonizing
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High Speed Steel
Lead and Salt
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Furnaces built for special requirements

Standard Fuel Engineering Co.

1646 Woodward Ave. Detroit, Michigan

Introducing

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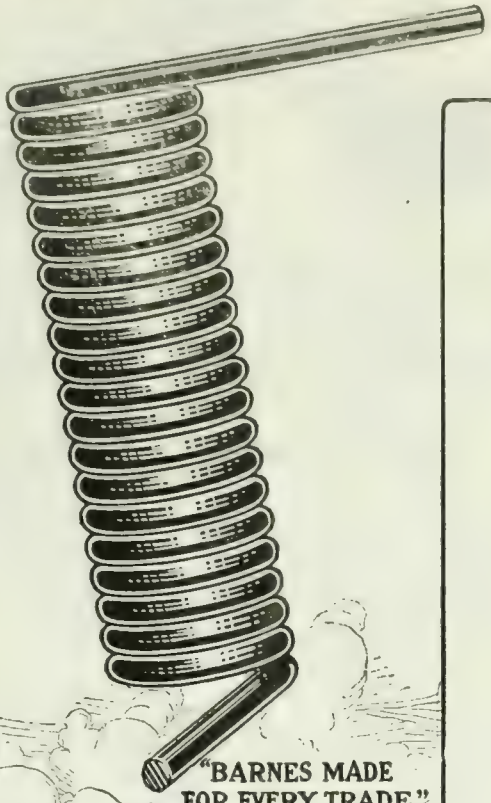

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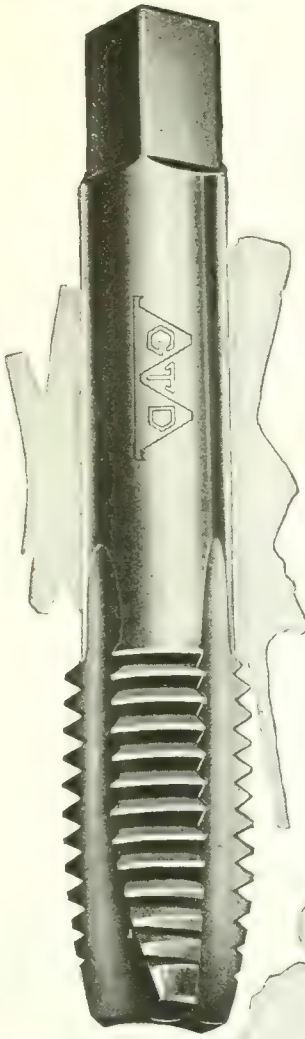

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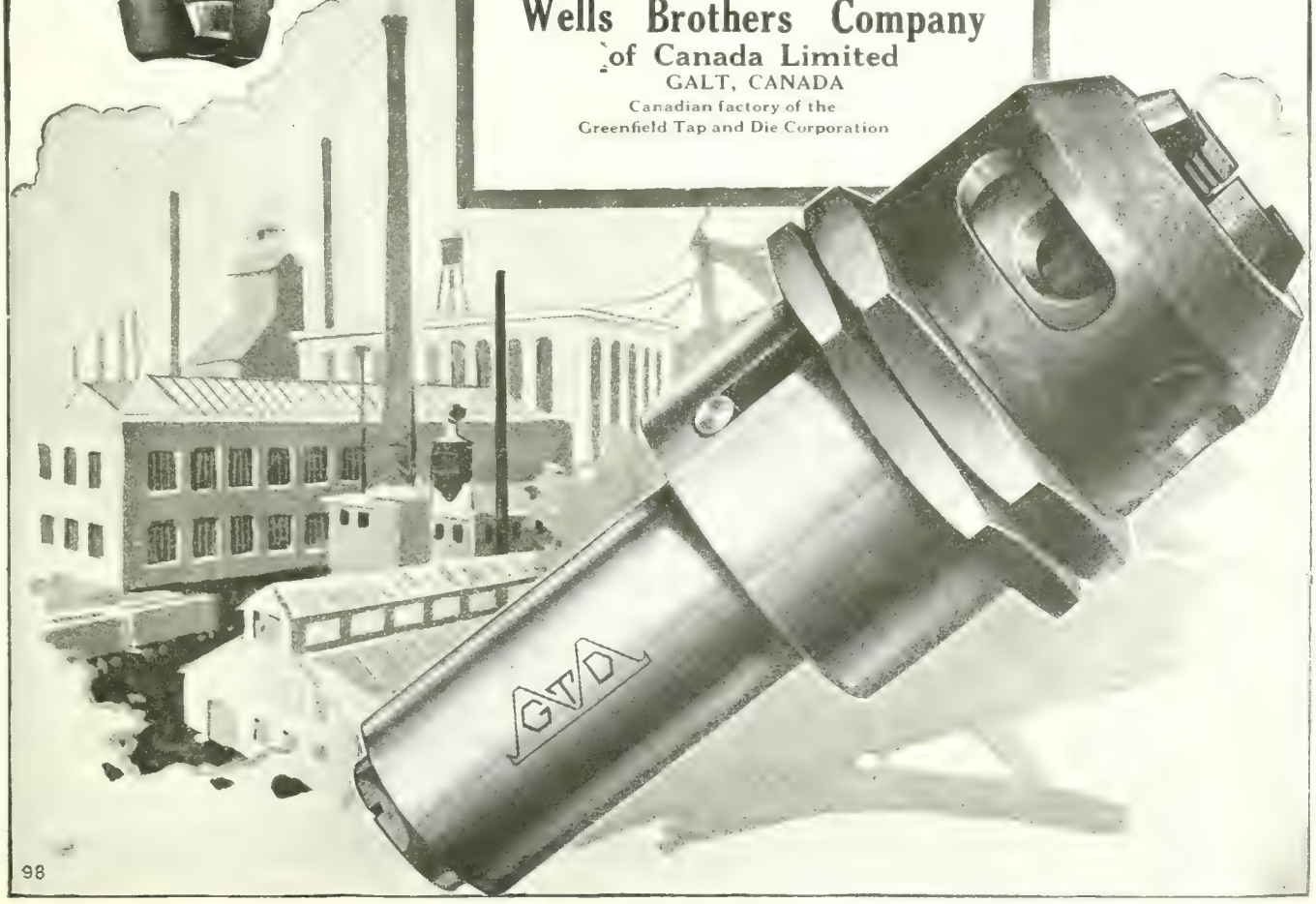

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Notes On Grinding

No. 60A

Cam Grinding

What causes Cams to show softness after grinding

A frequent difficulty met with in cam grinding is a sequel to the effect produced in the use of too hard a wheel, which causes the face of the cam to crack or check. The difficulty is known to the operator as the softening of the cam and is usually charged by him to some defect or error in the machine attachment or method, whereas as a matter of fact in almost every case it is due to carelessness in regulating the work speeds, the depth of cut or the grade of the wheel used.

By the best known methods of testing hardness, either by the Brinell meter or the scleroscope, when the proper speeds and grades of wheels have been used there is no effect of softening that can be detected by such tests. This matter comes back to the same old difficulties in cam grinding, namely, that it is usually the common practice in finishing cams to use too hard a wheel, which in order to act properly causes the operator to take too deep a cut, which generates so much heat that the compound does not dissipate it fast enough and the temper in the cam is drawn slightly, or in the other case when the other defect is noticed the cheeks of the cams are checked or cracked. But when light cuts are taken and soft wheels used these errors are entirely removed.

There is a knack in grinding cams which requires greater skill on the part of the operator than in most grinding operations. It is largely due to the fact that the cam is of an irregular shape and the action of the wheel at different points on the periphery of the cam varies, so that the operator has to use a great deal of care in adjusting other conditions, such as the speed of work, depth of cut, and flow of water to bring about the desired results.

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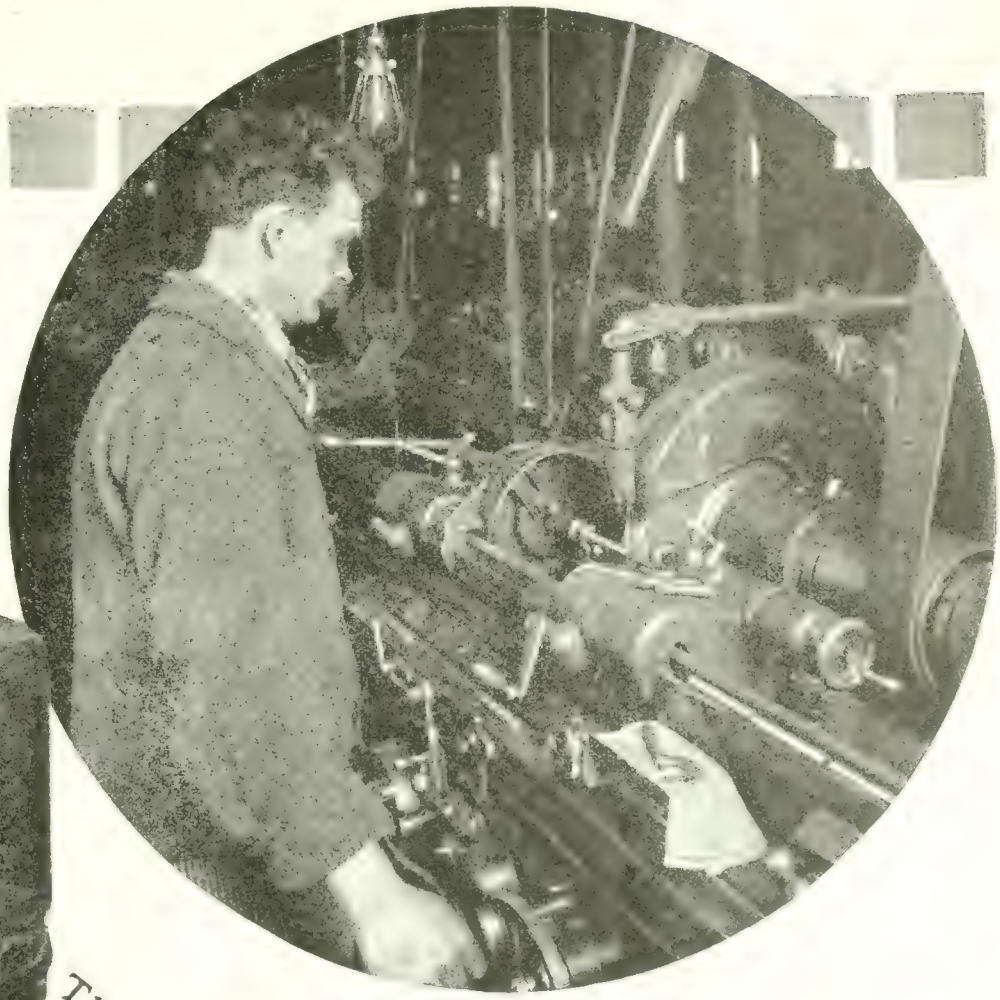

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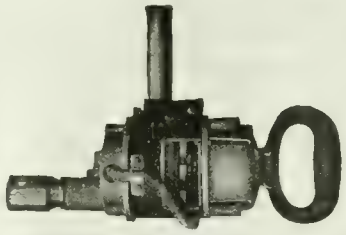

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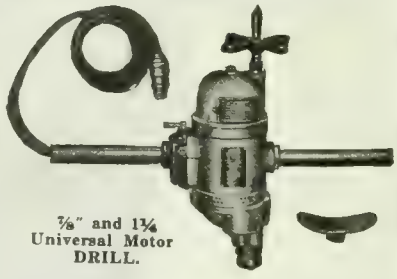

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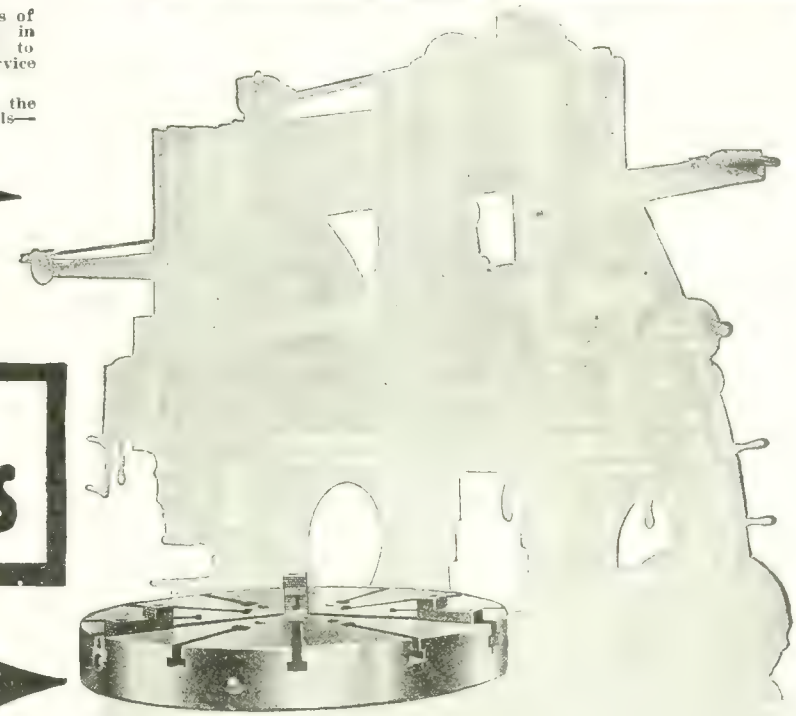

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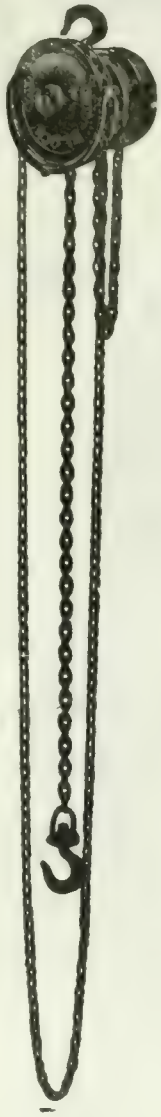

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CANADIAN MACHINERY
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MANUFACTURING NEWS

Volume XXII. No. 2. Toronto, July 10, 1919

Pneumatic Scraper for Fine Machine Work

No More Tedious Hand Scraping if We Use Such a Scheme as the One Spoken of in This Article—We Hear the Man in the Shop Exclaim, "It's Too Good to Be True."

By J. H. MOORE

IT is a well-known fact that one of the most responsible and delicate operations of the machinist, requiring both skill and perseverance, is that of scraping metal surfaces, usually cast iron, where minute accuracy is required. Under this head naturally we think of valves, valve seats, slides of lathes, planers, etc.

Such operations are usually entrusted to only the best of workmen, and at present in the majority of shops, this is considered a hand operation.

What may tend to change this style of scraping is an air-driven tool which the Anderson Brothers Manufacturing Co., Rockford, Ill., are now building, and which is illustrated by various photos throughout this article.

Such a fixture or tool should prove a valuable acquisition to any machine shop equipment.

The scraping tool in actual use is first shown at Fig. 1. This is carried at the end of a long arm, and the air cylinder and operating parts are located at the opposite end of this arm. To facilitate the manipulation of the tool, this air cylinder and its auxiliary mechanism are carried by a trolley which may easily be run back and forth on the supporting rail in order to enable the scraping tool to reach exactly the desired position on large pieces of work. The operator holds the scraping tool firmly down on to the work with the left hand, and the right hand is used to manipulate a knurled sleeve which actuates a valve in the air cylinder. When this knurled sleeve is pushed forward it allows the air to enter the cylinder and forces the scraping tool forward.

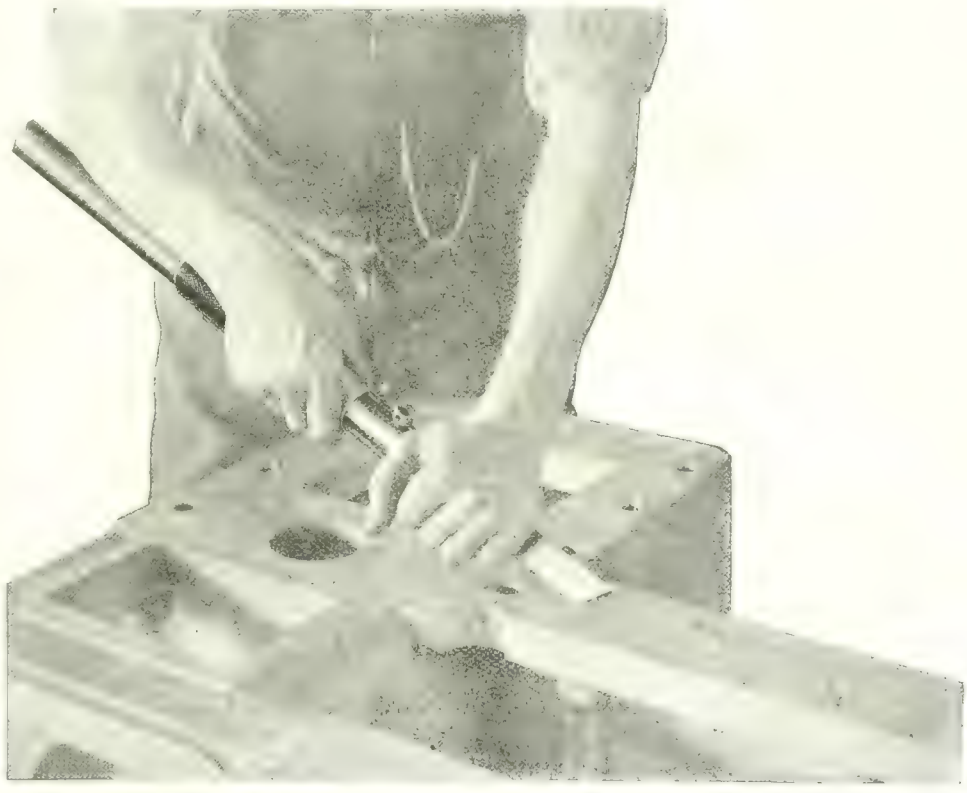

FIG. 1 THE SCRAPING TOOL IN ACTUAL USE

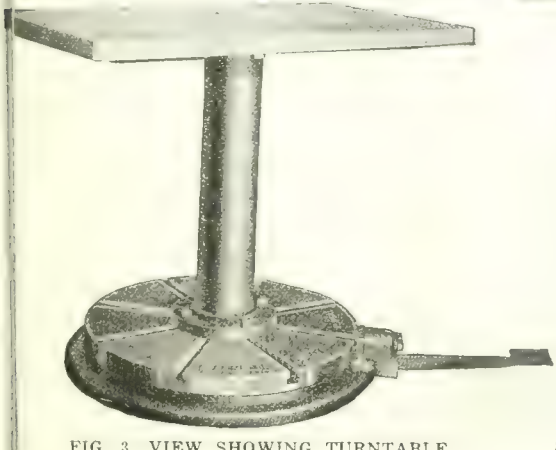

FIG. 3 VIEW SHOWING TURNTABLE.

As the only effort required of the operator is to hold the tool down to the work, he is relieved of the additional effort of pushing the tool forward, and as a consequence is not so tired at the close of the day as he otherwise would be were the job a hand process.

Fig. 2 illustrates two types of stands, first the stationary type of base, and secondly the portable base, which of course is more often used where one scraping tool is used at various parts of the plant. Fig. 4 later on in the article shows this portable stand in use.

Fig. 3 illustrates a turntable, on which the work can be placed, and by pressing on treadle you can turn the work to whatever position you desire.

We see the actual work being performed at Fig. 4, and the convenience

FIG. 2. THE TWO TYPE OF BASES.

of the apparatus is self-apparent. No doubt before long we will see all up-to-the-minute machine shops do their scraping by some method such as described.

A LARGE HACKSAW

By L. P.

Sixty years ago, and even later, the hack-saw was the most ill-used tool in a workshop. It was soft enough to be sharpened with a saw file, and was very soon blunt. No one would sharpen it after use, so filing it up was preliminary to using it. The teeth had no clearance beyond the rough side produced by the file, and so a deep cut was a laborious business that no one liked. The modern hacksaw is a very different tool and has effected extraordinary economies in the workshop. It is made of a very high quality of steel, having great durability, and, when handled with reasonable care, will do an enormous amount of work before being worn out. Fitted in a sawing machine in which the speed movement and pressure are carefully regulated, it will cut up round and square bars to finished lengths that require no further treatment. In course of time the size of the work it would undertake grew beyond anything at first contemplated, and to-day there is in use at the Royal naval gun factories in England a set of five motor-driven hack-saws that will deal with all hardened bars of gun steel 15 inches in diameter. They are looked after by one unskilled man and a woman. A larger machine has recently been added to the outfit of the same works. It weighs 3½ tons and will cut through a 26 in. square billet of steel with one blade that still remains serviceable. A 3 h.p. motor drives it. The cost of sawing is only one-sixth of the cost of the method previously employed. At the present time there is much competition in hack-saw blades as in files, so that their price remains so moderate that no well-appointed workshop can afford to be without them. It must, however, be noted that the modern hack-saw is not fool-proof; it can be spoiled in less than a minute by any stupid workman who, using it like a file, may rub the teeth off in a few strokes. The user should begin with a slow and steady stroke at a very moderate pressure, using the whole length of the saw until it is properly entered into the metal. The pressure may then be increased to a moderate degree, but it should never be excessive as the saw consists of a row of very small cutting points that are highly tempered and not meant for rough work. Rightly used, the hack-saw will save a great amount of filing and chipping, representing time that is convertible into money.

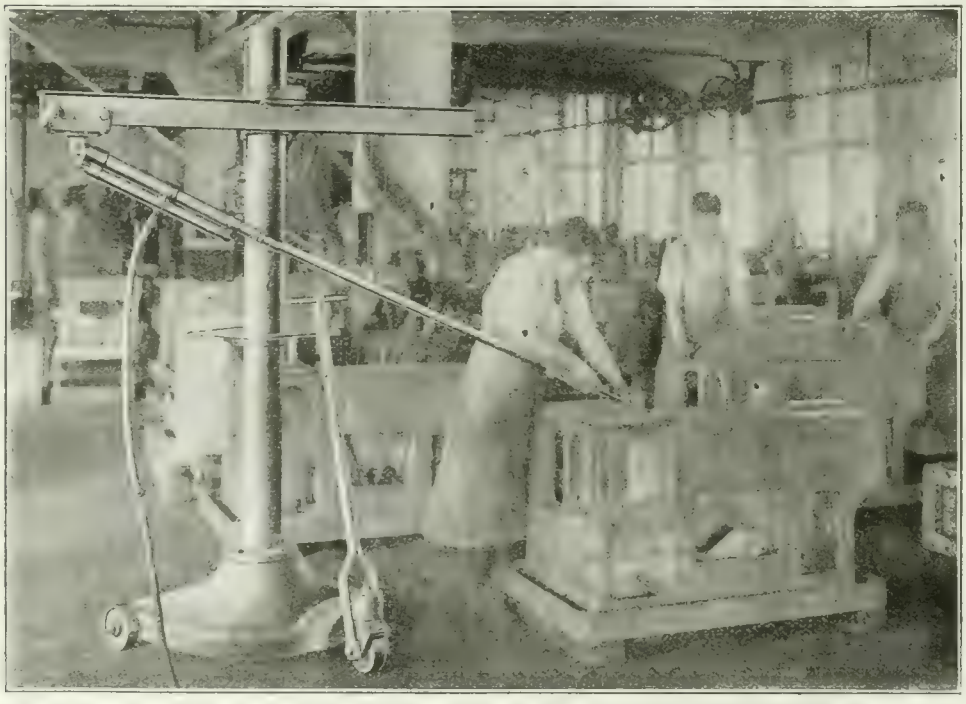

FIG. 1. THE ACTUAL WORK BEING PERFORMED.

HOW TO BLACKEN BOLT HEADS

By John H. Bedell

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Specially prepared lacquers can be obtained from supply houses for giving metal work for electrical switchboards a dull black finish. If such preparations are not available, dull black paints, which will serve in emergencies, can be obtained in ten cent or larger cans at most hardware stores or paint shops.

The following process has been used successfully for giving bright-finish steel cap bolt heads a dull black finish: First, heat the bolt to a dull red in a gas-torch flame, then dip it in asphaltum paint. Now burn the paint off with a blow-torch and rub it with a cloth while it is still warm. If the bolt is permitted to cool before it is rubbed with a cloth, the resulting finish will be glossy instead of dull.

Improved Process of Case Hardening

AS the result of an investigation into the prevention of flaking and chipping of certain case-hardened articles, such as nickel steel gear wheels used on motor car and aero engines, and straight carbon steel camshafts. Mr. D. Hanson and Mr. J. E. Hurst have devised certain modifications in the case-hardening process, which they described before the Iron and Steel Institute.

After a discussion of the theory of case hardening, the authors said that among the articles in which cracks developed during grinding were various forms of gear wheels made from steel containing about 2.3 of nickel. These had carburized in a mixture of charred leather with 10 per cent. of barium carbonate for 10 hours at a temperature of 900 degrees C., after which the box was withdrawn and cooled in air. For refining and rehardening a subsequent reheating to 800 degrees, followed by oil quenching, was adopted, and after this treatment the mechanical properties of the core and the hardness of the case were perfectly satisfactory. The gears were sent to another firm for grinding, and many of them failed during this operation, through the formation of fine cracks running from the surface into the metal. On cutting sections through the teeth of a number of wheels, and examining them under a microscope, in almost all cases a certain amount of free cementite, arranged in cellular form, was detected at the edges of the teeth. It was not invariably found, but in some cases might have been removed during the grinding process.

Slow Cooling

Experiments were made to elucidate this condition and to determine whether by submitting the steel to a slowly falling temperature during the later stages of the carburization a case would be obtained in which the harmful cementite network was not found. Pieces of the 2½ per cent. nickel steel were heated in contact with the carburizing material for 6½ hours at 900 degrees, at the end of which time there was a high concentration of carbide in the outer portions of the case. The temperature was then gradually reduced to 800 degrees, the refining temperature of the core, which temperature was reached in 4½ hours, and was maintained for a further four hours, the total length of the whole operation being 15 hours. It was found that by this treatment a depth of case was obtained equal to that formerly obtained by 10 hours heating at 900 degrees. These times were arrived at after a few preliminary experiments. The specimen was then cooled in the box, which was removed from the furnace.

Microscopic examination showed that this treatment had been very successful. The outer portions of the case contained in no part more than a slight cementite network, and on quenching the steel from 800 degrees it was found that no cementite was left undissolved, and the structure consisted mainly of a uniformly fine martensite.

In other cases the lowering of the temperature from 90 degrees was slower; in many operations on a works scale the whole period of 8½ hours was taken for this lowering, when the box was withdrawn without further treatment, with results that were quite satisfactory. Annealing for one or two hours at the lower temperature, however, appears to give a case slightly lower in carbon than a treatment in which the box is removed immediately 800 degrees is reached, but in all the cases examined no free cementite was found after the articles had been hardened.

Lower Final Temperature

More recently the authors have carried the reduction of temperature somewhat further. In the above cases the final temperature has been that of the refining operation. In their later experiments, and in routine operations on a large scale, this final temperature has been reduced to a point between the refining temperature of the core and the hardening temperature of the case. In articles made from a 3½ per cent. nickel steel the fallen temperature treatment has been carried out from 900 degrees to 740 degrees in the same time of 8½ hours, and the results have been entirely satisfactory. A case in 3½ per cent. nickel steel obtained by carburizing at 900 degrees for 6½ hours, and from 900 degrees to 740 degrees in 8½ hours, followed by cooling in the box, contained in the outer layers mere traces of a cementite network, and a layer of steel of practically eutectoid composition extended from the surface for a distance of .5 in. into the steel. Further, the transition from case to core was very gradual, and took place over a distance of .03 in. There was no sign of "liquation" at any point, and indeed the authors have failed to detect any signs of this phenomenon in any of the steels which they have examined after submitting them to this treatment.

Practical Results

This modification of the case hardening process has been adopted for some months past in the works of Messrs. D. Napier and Sons (Limited) in all operations on straight carbon and nickel steel parts (except 5 per cent. nickel steel) and has given highly successful results. Many thousands of articles have been treated, and the amount of scrap material has been reduced from at least 25 per cent. to practically nothing. For example, by the old methods of carburizing the scrap in the manufacture of air screw shaft gears from a 2½ per cent nickel steel amounted to 25 per cent. On adopting the 900-800 deg. falling temperature treatment this was reduced to 2½ per cent. On changing to the 900-740 deg. treatment (the steel at the same time being altered to 3½ per cent. nickel), up to the time of writing, out of 75 completed gears, none has been found defective. Experience with other forms of gears has been equally satisfactory. In the manufacture of valve end-pieces from 3½ per cent. nickel steel, out of the first 500 manufactured by the old method of carburizing at 900 deg. at least 25 per cent. were defective. By adopting the 900-740 deg. falling temperature treatment the trouble has disappeared.

With straight carbon steels equally satisfactory results have been obtained. In the manufacture of cam shafts, for example, the only failures which have been experienced since the modifications were introduced are very small in number, and can, in each case, be traced to excessive non-metallic enclosure in the steel. In every case in which grinding cracks have developed a sulphur content of over 0.1 per cent. has been found, and microscopic examination has revealed large quantities of sulphide.

It may be safely said that since the introduction of the modifications of the case-hardening process which have been described troubles from flaking and cracking during and after grinding have become practically unknown, and the very few cases which have occurred can all be connected with material which is otherwise defective.

Carburizing 5 Per Cent. Nickel Steel

With articles made from 5 per cent. nickel steel, trouble from flaking has never been experienced, in spite of the fact that the usual practice has been to carburize at 950 deg., a temperature considerably higher than that used for any of the other steels mentioned in this paper, and at least 150 deg. above its upper critical point. The authors suggest that the explanation is probably to be found in the fact that this steel, when carburized, is air-hardening, and normal slow cooling in the box is sufficient to suppress the carbide separation, or, at any rate, to prevent its separation in a harmful form. They have not, however, investigated this steel.

Description of a New Automatic Threading Tool

In This Article is Described a Very Interesting Tool Fixture Recently Placed on the Market by a Well-Known English Firm—Its Description Is Well Worth the Reading.*

It is often necessary, and still more often desirable, to cut screw threads on a number of pieces of work in the lathe; whether on centers or in chucks. It takes a great deal of time to make the successive cuts and get the exact size. Much of this is non-cutting time; in the reverse travel, advancing the tool, changing to finishing tool or comb, etc. When the screw has to end against a shoulder the trouble is doubled. There has not, hitherto, been a practical fixture or attachment for the lathe to deal with this class of work with any reasonable approach to self-acting efficiency.

A new tool fixture recently placed on the market by Alfred Herbert, Limited, Coventry, has been designed specially for this work, in cast iron, bronze, brass and other soft metals. It is not recommended for steel.

Before describing it we may as well summarize its advantages as compared with the usual method of screw cutting in the lathe.

1. It will cut a complete form thread in one travel of the saddle.

2. The thread is cut by six separate tools, which take the various cuts from roughing to finishing.

3. It will cut to a fixed point or up to a shoulder and finish the last thread.

4. Each tool automatically springs clear of the workpiece at a set point, which may be as close to a shoulder as in the ordinary process.

5. Once set it will automatically repeat the same size of thread on any number of similar pieces until the cutting tools require sharpening. It is not necessary to measure each piece, further than to check occasionally, as in screwing with dies.

These five advantages may be condensed into one statement—that the tool will cut a completely formed thread to required size in a fraction more time than is now taken for one cut; or, allowing for reversing, measuring, etc., it will cut the thread in less than one-tenth of the time.

This, of course, refers to a thread turned in the lathe true with the other turned parts of the workpiece; or with the workpiece as chucked or centered if the other parts are not turned.

The construction will be fairly clear from the illustrations, which show different views of the tool fixtures. In its assembled state it is in two parts: a tool box and an abutment, or stop piece.

The abutment, shown in Fig. 1, fits the Alfred Herbert No. 4 capstan lathe. It could be adapted to most lathes or a special stop made. It must, of course, be firm, clear of the moving parts of the lathe, and be adjustable to a fine degree; but the making presents no special difficulty.

The tool box is fixed on the cross slide of the lathe, and once the correct diameter of screw is attained the slide may be firmly clamped so that no small movement or shake may occur. The usual change wheel setting and lead screw are used to travel the saddle in the usual way, except that a complete thread is formed in one travel.

The chasers. The six tools are varied on their cutting edges so that the first starts cutting on the full round surface and the last chases and finishes the thread. The tools are in correct continuous pitch with each other, so that each precisely takes up the work left by the one in front of it. The tools or chasers are of usual form, but accurately ground on the shanks to slide in their places and with a cross slot near the back end, as shown in Fig. 5.

The recoil. Above each chaser is a bar with a projecting piece, the detent bar, to engage the slot in the chaser and suitably formed to be influenced by springs. A stepped former bar, shown in plain view in Fig. 4, with the box cover and detent bars removed, holds the chasers in cutting position until the set point for the recoil is reached. As shown in Fig. 4, the stepped bar has been pushed along to allow three chasers to recoil and still holds three in cutting position—the first of the second three being near the point of recoil. It will be clear that the stepped bar is stopped by the abutment, while the saddle and tool box move along the cut under the action of the lead screw. Therefore the

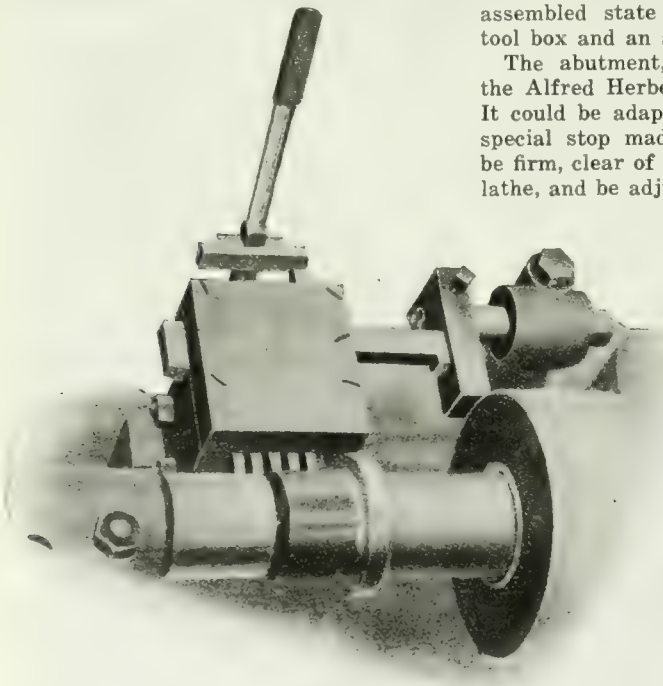


FIG. 1—GENERAL VIE WOF TOOL IN ACTION.

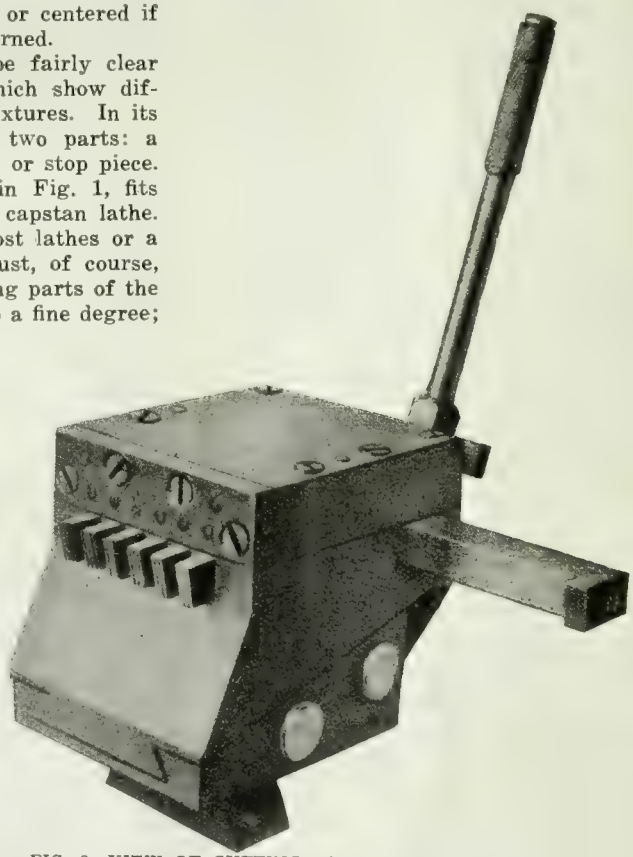


FIG. 2—VIEW OF CUTTING TOOLS AND STEPPED BAR.

*From "Machine Tool Review."

chasers will successively and automatically recoil at the same point.

Re-setting. When a thread is finished the saddle is released from the lead screw and travelled back in the usual way. The chasers are all pushed back simultaneously by the handle and plate bearing on the rear ends of the detent bars, and thereupon the stepped bar springs back to the full extent, as shown in Fig. 2. Another workpiece is then inserted in the lathe and the half-nut put into action as usual.

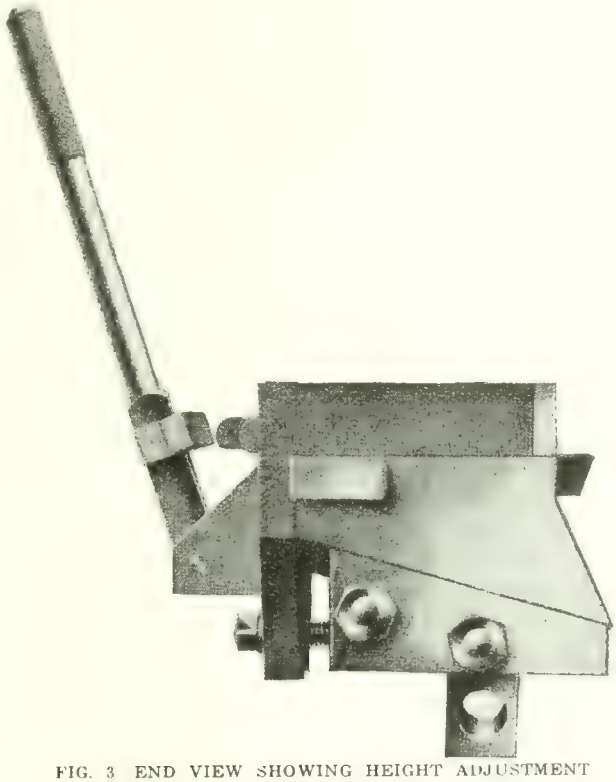


FIG. 3 END VIEW SHOWING HEIGHT ADJUSTMENT

Sharpening the tools. The chasers must be ground on a machine, surface grinder or cutter grinder, as the grinding must be equal and accurate. Two methods are available: (1) To take out the chasers and clamp the set accurately together and grind all at once; or (2) to transfer the tool box with the chasers to the grinding machine table and grind all together in position. The chasers are ground flat on the top.

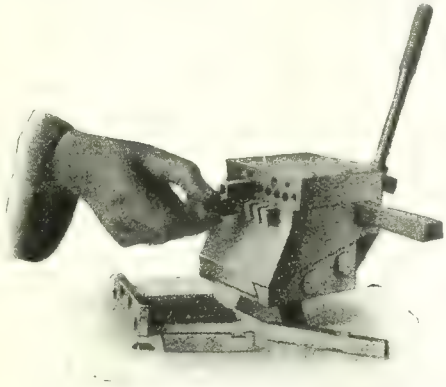


FIG. 5—METHOD OF REMOVING TOOLS.

Setting up. The setting up is reduced to a simple matter. First, fix the tool box and stop to allow the necessary clearances. Then adjust the height of the cutting edges to the diameter and material to be cut. Fig. 3 shows a square head screw for adjusting the height to a nicety and the nuts of the two clamping screws which hold the tool box firmly when adjusted. Figs. 6 and 7 show the main measurements, etc.

Cutting position. The tools being flat on the top, how is the cutting rake obtained, and how varied? Reference to Fig. 6 will make this clear, with a little explanation. The workpiece is shown as a circle, the center of which is below the level of the tool edge. A line drawn from the tool edge to the center of the workpiece would show the top rake as an angle, and this angle can be varied by adjusting the height of the tool edge in relation to the center of the workpiece. A table in the catalogue shows the height of tool edge above the workpiece center equivalent to rakes of 8, 10, 12, 14 and 16 degrees, and shows them for various diameters. For example, a rake of 12 to 14 degrees is suitable for cutting cast iron, and the table shows that a height, as defined, of 7-32 in. to ¼ in. will equal these rake angles for a 2-in. diameter. Similar figures for other diameters and rakes are given; 8 to 10 degree rake is suitable for cutting brass or gun metal, etc. The clearance below the cutting edge is sufficient for the necessary rakes.

The fixture is very compactly made, and sets of tools are stocked to cut Whitworth standard threads from 10 per inch to the finest pitches. The fixture is protected by patent, and is called "The Coventry Automatic Threading Tool." We understand that a small number of the fixtures are ready for delivery and more are in hand.

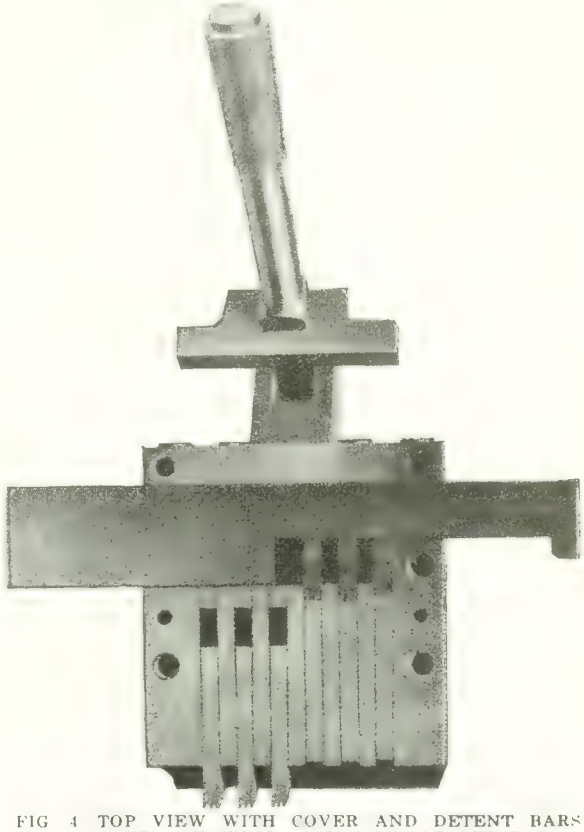


FIG 4 TOP VIEW WITH COVER AND DETENT BARS REMOVED, SHOWING ACTION OF STEPPED BAR.

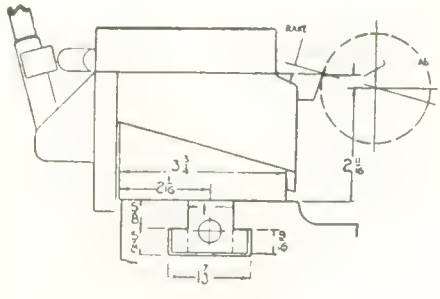


FIG. 7 —FRONT VIEW OF FIG. 6.

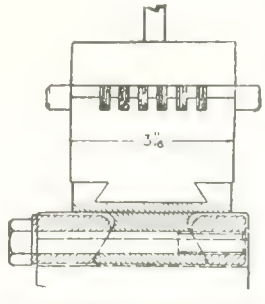


FIG. 6 MEASUREMENT AND METHOD OF ADJUSTING TOP RAKE OF TOOLS.

Leather Prices Still High.—With advances in the different grades of from 1c to 17c, the tendency is for still higher prices. The overseas demand has cleaned out the stocks of leather merchants and tanners, and the price of both shoe and harness leather is affected.

Shop Arithmetic, Mensuration of Solids

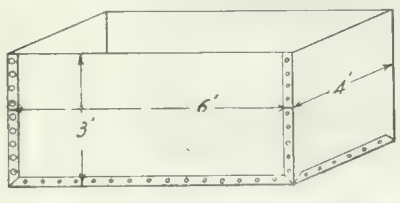
Eighth of a Series in Practical Mathematics for the Mechanic and Those Learning the Machinist Trade—The Present Article Takes Up the Subject Mentioned in the Title

By J. H. RODGERS

IN calculating the area of plain figures, length and breadth are the only two dimensions required, apart from such constants as are universally recognized for the solution of problems of this character. For the measurement of solids (figures that occupy space) three dimensions are necessary, and with these any constants that have been derived for easy solution. The surface of the solid enclosing the space is found by adding together the areas of the several sides. The surface of a cube would be equal to six times the area of one of the sides. The volume would be the area of one of the sides multiplied by the thickness.

The unit of measurement is the cubic inch, the cubic foot, or the cubic yard, the latter being used chiefly by civil engineers in excavation calculations. Some of the more common solids are shown in the chart herewith together with the formulae required for finding the value of the different elements.

To illustrate the practical application of the measurement of solids, we will give a few concrete examples. Suppose it is required to construct a tank that will contain 540 gallons of oil, and the floor space allowable is 6 by 4 feet, what will be the height of the tank? The volume of the U. S. gallon is equal to 231 cubic inches, and the first detail required is to find the cubic contents equal to 540 gallons. This is found by multiplying the volume of one gallon by the number of gallons; thus:



231 x 540 = 124740 cu in or
124740 ÷ 1728 = 72·18 cu. ft.

As the area of the base is 6 x 4 feet, or 24 sq. ft., the height would be:

72·18 ÷ 24 = 3·008 ft. or 3 ft. ·11 in

Suppose we have a cylindrical tank to make that will contain 1,000 gallons, and we are restricted to a height of 6 feet, what will be the diameter, and also the dimensions of the flat sheet required to form the cylindrical portion, allowing for a lap seam of 2 inches? The volume corresponding to 1,000 gallons would be:

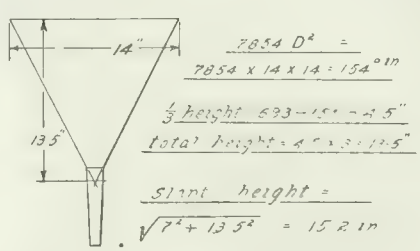
231 x 1000 = 231000 cu in or
231000 ÷ 1728 = 133 68 cu ft.

As the height is to be 6 feet (no allowance being made for the thickness of metal) the cross sectional area will be: 133.68 ÷ 6 = 22.28 sq. ft. The diameter can then be found by dividing this value by .7854, and extracting the sq. root of the quotient.

$$\sqrt{\frac{22.28}{.7854}} = \sqrt{28.342} = 5.32 \text{ ft}$$

The length of plate would equal the circumference of the tank, plus the width of the lap seam, or—(64 x 3.1416) + 2 equals 202 inches.

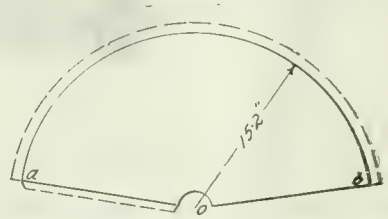
A cone-shaped funnel is required, its maximum capacity to be 3 gallons, and the large diameter to be 14 inches; what will be the central height of the cone, neglecting the diameter of the small end? The volume of three gallons would be 231 x 3 equals 693 cu. in. The volume of a cone equals the area of the base times one-third the altitude, or axial height. Therefore, one-third the height will equal the volume divided by the area of the base. In this case the area of the base would be:



.7854 D² =
7854 x 14 x 14 = 154 °in
⅓ height 693 ÷ 154 = 4.5"
total height = 4.5 x 3 = 13.5"
slant height =
√7² + 13.5² = 15.2 in

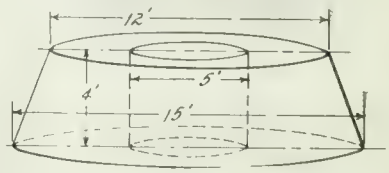
These dimensions, however, are of little value unless we know how to lay out, on a flat surface, a shape that, when formed up, will give us the cone desired. First, find the slant height by the principle of the solution of right angles. The slant height is equal to the hypotenuse of a right triangle with sides of 7 and 13½ inches respectively, these dimensions representing the radius of the base and the perpendicular height. The slant height will then equal the sq. root of the sum of the squares of these two lengths.

Now, with a pair of compasses or trammels, describe a portion of a circle having a radius of 15.2 inches. Then from the point A lay off a distance A-B, equal to the circumference of a 14 inch circle. Connect B with O and the enclosed space will represent the shape of the piece required. In addition to this



it will be necessary to add sufficient to one edge to make the seam, and also on the outer circumference for wiring or stiffening purposes. A small portion at the apex will require to be cut away to provide for the lower opening. These modifications are shown in dotted lines.

A concrete foundation, in the form of a frustum of a cone, and with a hole in the centre 5 feet in diameter, is required for a machine support. The lower diameter is 15 feet, and the top diameter is 12 feet, with a height of 4 feet; what would be the number of cubic yards of material in the foundation? The volume of a frustum of a cone is found by adding the area of the upper and lower bases and the square root of the product of the two areas, and multiplying the sum by one-third the altitude. The area of the bases would be:



15² x ·7854 = 176·7 sq. ft.
12² x ·7854 = 113·1 sq. ft.

Placing the above rule in the form of a formula, and representing the base areas by A and a, and the altitude by H, we have:

$$\frac{1}{3}H\left(A+a+\sqrt{A\times a}\right)=\frac{1}{3}H\left(176.7+113.1+141.36\right)$$

$$\frac{1}{3}\times 4\times 431.16=574.88 \text{ cu in}$$

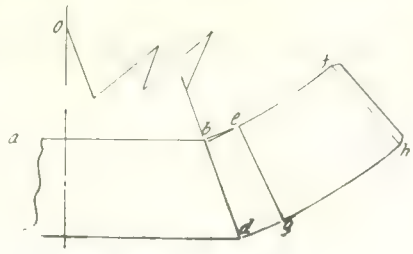
From this we deduct the volume of the centre hole, which would be:

$$5^2\times .7854\times 4=78.54 \text{ cu ft}$$

$$\&\ 574.88-78.54=496.34 \text{ cu ft}$$

If a sheet steel protecting casing was placed on the outer convex surface, what would be the shape of each portion if the frustum was composed of 8 pieces, with 2 inch laps?

The method of developing the flat sheet is shown in the above sketch, where the foundation of casing is shown



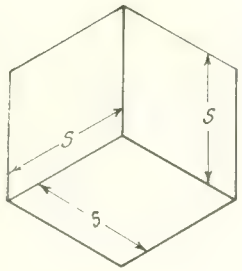
in elevation, with the axial line and the slant surface, produced to meet at the point O. With O as a centre and O-B and O-D as radii, describe the areas B-F and D-H. On the outer arc lay off a distance equal to ⅛ the circumference of the lower base circle, and from the ends draw the radii G-E-O and H-F-O. The portion E-F-G-H will be the shape required. Add the required lap for the seam.

Suppose we wish to make a sphere of cast iron that will weigh 80 lbs., what must be the diameter? Cast iron weighing .26 lbs. per cu. in. The cubic inches in the ball would be the total weight divided by the unit weight, or 80 ÷ .26 equals 307.7 cu. in. The volume of the sphere equals the cube of the diameter multiplied by .5236. Therefore the diameter will equal the cube root of the quotient of the volume divided by the constant .5236, or

$$\sqrt[3]{\frac{V}{.5236}}=\sqrt[3]{\frac{307.7}{.5236}}=\sqrt[3]{587.60}=8.37'' \quad (11)$$

The convex surface of a sphere equals 3.1416 D^2. The convex area of the above ball would be 3.1416 D^2 equals 3.1416 x 8.37^2 equals 220.1 sq. in.

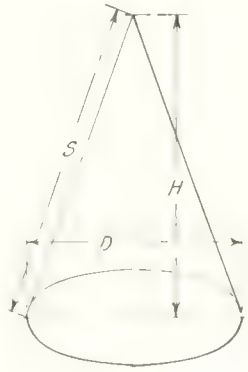
Data for Chart



CUBE

The exposed surface of a cube equals six times the area of one of the sides, or S x S x 6.

The volume equals the area of one of the sides multiplied by the thickness, or S x S x S.



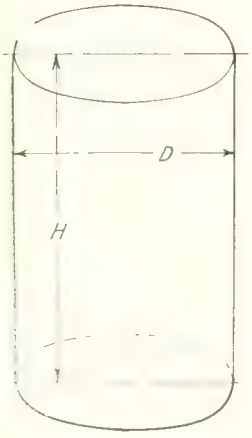
CONE

The convex area of a cone equals the circumference of the base multiplied by one-half the slant height, or A equals 3.1416 D x .5 S.

The volume equals the area of the base multiplied by one-third the altitude, or V equals A x 1/3 H.

The slant height equals the square root of the sum of the squares of the base radius and the altitude, or

$$S=\sqrt{\left(\frac{D}{2}\right)^2+H^2}.$$



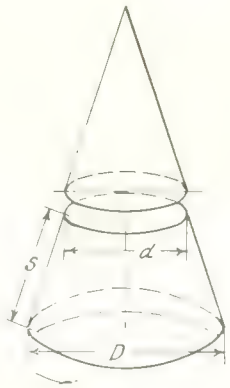
CYLINDER

The convex surface area equals the circumference multiplied by the height, or 3.1416 D H.

Area of one side equals .7854 D^2.

Volume equals .7854 D^2 H.

Contents in U. S. gallons equals the volume in cubic inches divided by the constant 231.



CONE FRUSTUM

The convex surface of the frustum of a cone equals the product of the slant height and one-half the sum of the perimeters of the two bases, or A equals S x .5 (3.1416 D + 3.1416 d).

The volume equals the sum of the areas of the upper and lower bases and the square root of the product of the two base areas, multiplied by one-third the altitude, or

$$V=\frac{3.1416}{4}\left(D^2+Dd+d^2\right)\times\frac{1}{3h}$$

The slant height equals the square root of the sum of the squares of the altitude and the difference between the radii of the bases, or S equals $\sqrt{H^2+R^2}$.

SPHERE

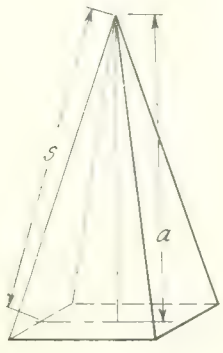
Convex surface equals $3.1416\ D^2$.

Volume equals $.5236\ D^3$.

CIRCULAR RING

Convex surface equals the circumference of the cross section multiplied by the length of the central line of the ring, or A equals 3.1416 d x 3.1416 D.

The volume equals the area of the cross section multiplied by the length of the central line of the ring, or V equals .7854 d^2 x 3.1416 D.



PYRAMID

The convex area of a right pyramid equals the perimeter of the base multiplied by one-half the slant height, or A equals perimeter x S.

The volume of a right pyramid equals the area of the base multiplied by one-third the altitude, or V equals A x 1/3a.

WHAT OUR READERS THINK AND DO

Centering Chuck Work Discussion Re-opened

Readers of Our Magazine Are All Het Up Apparently Over the Subject of the Art of Proper Centering. Here Are Three More Suggestions, With Which We Will Close This Discussion

Compiled by J. H. MOORE

ANYBODY who remarks that CANADIAN MACHINERY is not well read may take a back seat at once, for we have proof positive every day as to the wide field which it covers. The interest taken in the article by J. J. McIntyre in our May 8th issue, regarding his method of centering, started another proof ball rolling, for since his article appeared all sorts of schemes, replies, and criticisms have rolled in from various readers.

In our May 29th issue we reviewed the article and published two other suggestions. But still the ideas roll in.

To close this discussion, which, of course, must close some time, we publish three more schemes and call it quits. Be it understood that we have played a strictly neutral role in this matter and continue to do so. These three articles are published to illustrate the variance of opinions on the subject.

We will first see what a Brantford reader has to say:

MY IDEA OF QUICK CENTERING
By S. G. MACKLIN

Referring to page 554, your May 29th issue of CANADIAN MACHINERY, I would like to know why these gentlemen go to this trouble to centre work? Or what are the particular circumstances that make it necessary in this line of work?

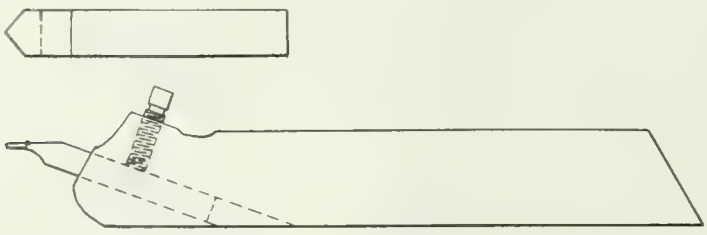


FIG. 1—S. G. MACKLIN'S SUGGESTION.

In our line the only circumstance that would justify this method of centering work would be when one diameter is the centre in the chuck's centre, make the required centre in the work without giving the matter any thought at all (being one diameter of the stock,, in which case we would proceed as follows:

We would chuck the work, and face the end, using an Armstrong tool holder, then without changing the tool holder, but removing the tool bit, we would insert a tool bit ground as a centering tool, as shown at Fig. 1.

The face, A, is ground parallel with the holder, as shown and ground like a flat drill 118 degrees included angle. The advantages of the incline of the tool holder is self apparent for it supplies a ready means of quickly bringing the tool to the centre.

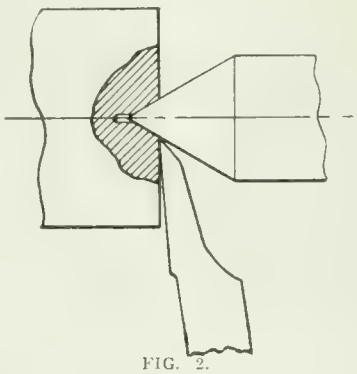


FIG. 2.

Having now a centre in the work, we take the drill chuck with its No. 3 Morse taper unglorified, and using the tail

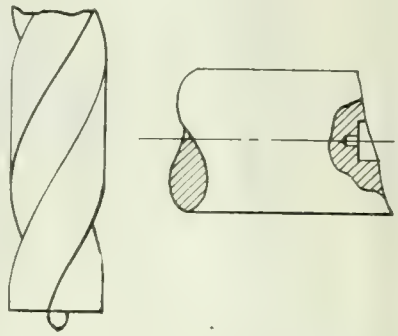


FIG. 3.

of the things in a day's work). It is taken for granted (just as the blacksmith puts his tongs on a piece of work and places it in the fire without any thought that the fire will make it hot) so to continue.

Now let the writer issue a little tip for the man that always leaves a tit on his faced ends. Is he not aware that by letting the centre back a little the tool can be made to pull the work over and cut from the edge of the centre, and tightening up as soon as the tool is past the centre, being careful to note that the tool is reasonably near the shape required for such an operation, similar to shown at Fig. 2?

Another scheme is as follows: Make two stabs at the work by grinding a twist drill, with a little pilot on it and square faces, at Fig. 3, before putting the 60 degree centre in the end of the work, face down, as far as it may be necessary to straighten the end of the piece.

To refer once more to where we started we admit that in cases of necessity this method of centering work is advisable, but for a general practice, making special tools to centre work looks like a long way round for a short way home.

Now that Mr. Macklin has had his views aired, let us hear from another reader from Amherst, Nova Scotia:

REGARDING CHUCK DISCUSSION

By T. WILLIAMS

Regarding quick method of centering chuck work. CANADIAN MACHINERY is read by quite a large number of tool makers, machinists and apprentices that they may become more efficient; as well as executives, who want to keep abreast of the times.

It is a good idea to be able to exchange views and know how things are done in other shops as new ideas spring up from time to time. It is also instructive reading, how some difficult repair has been accomplished in a thorough and workmanlike manner. With your assistance, Mr. Editor, I would like to see CANADIAN MACHINERY maintain this standard.

I know you are not responsible for other people's views.

In CANADIAN MACHINERY of May 29th, page 554, referring to Fig. 1, I fail to see how Mr. S. Simpson can claim an improvement on Mr. J. J. McIntyre's "Chuck Under Discussion," illustrated on the same page.

Everyone who uses combination drill and countersinks know, and sometimes to their sorrow, how easily they are broken.

Referring to Fig. 1 to use it, it is first necessary to spot drill the piece of work or locate the centre; otherwise reverse the tool-holder or replace with a suitable piece of stock in the tool post. Place the drill chuck complete, as shown in Fig. 1, in position for drilling, and bring up the back centre; now the tail of the lathe dog most likely will bear on the compound rest to prevent turning; if the piece of work to be centered has not already been spot drilled, the piece of stock in the tool post, as before mentioned, must be brought against the drill to bring it in the centre. With the drill chuck placed in position the drill has a greater strain on it by virtue of the extra weight than it would have by using Mr. J. J. MacIntyre's "Chuck Under Discussion" idea, which is self-centering, and holding the same by the fingers, as shown in the photograph.

And the fact of it being self centering it is unnecessary to use a piece of stock in the tool post to force the drill in the centre.

He goes on to say such a scheme has its disadvantages, for, first, it is difficult to tighten the chuck with the hands, etc. It should be unnecessary to call Mr. S. Simpson's attention to the fact that those chucks as illustrated are supplied with a pinion wrench to be used for tightening, and by so doing it is not necessary to use the vice under ordinary circumstances.

Last, but not least, we come to the views of a Halifax reader.

CHUCK DISCUSSION

By G. R. FOWLER

I noticed the articles in CANADIAN MACHINERY in connection with centering chuck, and I think I can offer a better suggestion than any I have read so far. Make a collet, as shown at Fig. 4, to fit the tapered portion of tail stock of lathe, and place a ¼ in. pin in the same, which in turn will fit into slot across the end of tail stock barrel, preventing the same from revolving while the strain of drill is on.

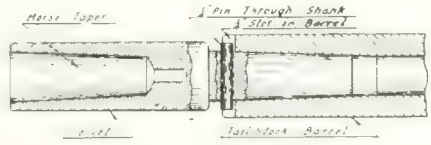


FIG. 4—G. R. FOWLERS' IDEA.

The end of collet is tapered to fit chuck or drill, and made with the usual slot going through in order to receive key for removing chuck or drill.

By adopting this method everything is central, and by using combination drill and countersink, it will not be necessary to spot work with the tool at all.

I made one of these collets to fit all of our lathes, and find them very handy and quick, not only for centering, but for drilling. By slotting end of bush in headstock to receive pins through male part of collet it can also be used for drilling cast iron pipe flanges, etc., which may be too long to go under the drill press.

By using tailstock as a means to feed the work up to drill, and placing drill chuck in collet, when the live centre has been found very useful for turning small ——— which would be found difficult to hold in a large chuck.

There are several other advantages that a practical man will readily see, so hope you see fit to print this in regards to the discussion.

Here endeth the discussion so far as we are concerned. Our space in this section is limited, so we must get into other fields. Is there not some jig or fixture of any kind that has proved a real saving proposition? If there is we want to have the privilege of looking your sketch and article over to see if we can use the same in our columns. We pay for such articles, so get moving and make some easy money on the side. Did you note that Brantford, Amherst, Nova Scotia; and Halifax, were the parts where these letters came; and our distribution centre is Toronto? Think it over.

Tunnel for Windsor.—There is a good deal of talk going on here on the subject of a tunnel between Windsor and Detroit under the Detroit River. The idea originated with Mayor Winter, and a Detroit contractor has already called on the Mayor and made tentative proposals for the construction. Estimates of the work are that it could be done for $6,000,000, exclusive of approaches. The plan would be for each city to build the approach to the tunnel on its own side, and the cost of the tunnel itself to be borne by a stock company. A toll sufficient to pay a reasonable return on the investment could be charged and arrangements made for the two cities to take the subway over after a reasonable time.

REGARDING STAMP CLEANER ARTICLE

WE have had brought to our attention a matter of a rather serious nature regarding an article we published recently in our columns.

This article was entitled: "Cleaning Off the Title Stamps." In the same was mentioned that the contents of a fire extinguisher made an ideal stamp cleaner.

On the surface, this seems like a good joke on the extinguisher, but listen to what one of our readers has to say.

"Referring to a recent article in your paper, with reference to extracting carbon tetra chloride from fire extinguishers. It is admitted that carbon tetra chloride is a well-known, but somewhat expensive cleaning agent or solvent and is largely used in the arts for this purpose.

"In view of the strong efforts now being made by various parties, including some of the Canadian trade and technical papers, in order to endeavor to prevent some of the terrific waste that is now taking place from fires, it is felt that this article is a little out of place.

"One of the difficulties met with around factories, stores, etc., in connection with the maintenance of chemical extinguishers is to prevent tampering. Tampering being a great difficulty, especially with extinguishers of the one quart carbon-tetra chloride type, of which the "Pyrene" is a sample.

"These extinguishers, when new, or issued from the makers, are sealed with a fine wire, and several firms make it a practice to periodically send a man around to reseal these extinguisher handles from time to time.

"You will appreciate that if the extinguishing agent is removed from an extinguisher by all or sundry who require the fluid for cleansing purposes that when the emergency arises the apparatus will fail.

"I would suggest that a good way of endeavoring to remove the harm done would be for you to insert an article somewhat as follows:

"It must be distinctly understood that to tamper with fire extinguishers under any conditions is absolutely prohibited, the reason being obvious.

"I trust you will excuse my calling your attention to this apparently trivial matter, which, however, is of quite a serious nature."

We thank our correspondent for this reminder, and heartily endorse his statements, that, much as we wish an ideal cleaner, we do not wish to perhaps endanger life as a result of thoughtlessness.

Construction Men for France. — The Canadian Des Moines Co., of Chatham, are asking for sixty steel erectors and riveters to proceed to France for nine months' work. The place mentioned is Bordeaux, and the work consists of erecting observation towers. Board and transportation will be paid each way and pay commence at the start of the trip. Wages offered are 70c per hour and a 50-hour week.

DEVELOPMENT IN SHOP EQUIPMENT

BEAMEN & SMITH CONTINUOUS MILLING MACHINE

THIS is a heavy, rigid manufacturing machine, designed for the rapid and economic handling of milling work.

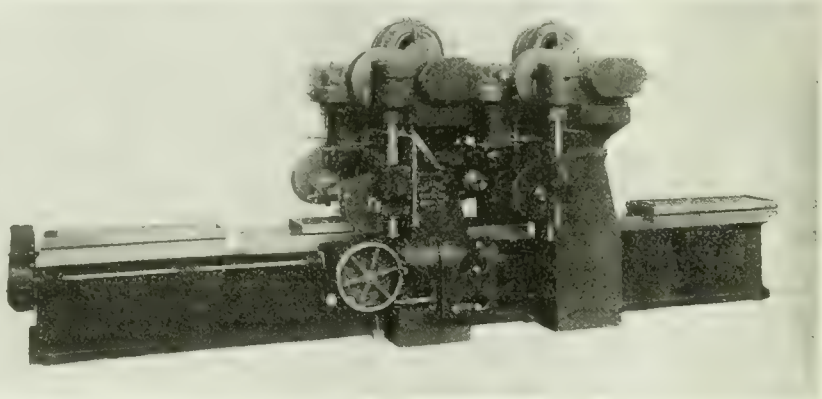
It consists of a substantial bed to which uprights are attached. A pair of these uprights supports the horizontal spindle heads and the cross rail which carries the vertical spindle heads. Each pair of uprights with its bank of spindles is one milling unit. As many spindles may be mounted on this unit as necessary, and as many units may be attached to the bed as required to do the work. Usually two are sufficient. The feed driving mechanism is carried on one unit only.

Removable tables, carrying the work, feed continuously along the bed, (taking a fast motion when the cutters are idle and a slow motion when the cutters are working.) These tables, after having passed all the cutters, are lifted from the bed and the finished work removed. Another table with the work already attached is placed on the front end of the machine and the process repeated. As many tables are furnished as are necessary, usually four, to maintain continuous milling. Such machines will handle, on one trip of each table by the cutters, any milling required on two sides and the top of any piece, within its capacity. By loading the tables to capacity a large amount of work can be handled in a very short time.

A single glance at the cut shows a sturdy machine with two units and three removable tables. A closer inspection shows the wide variety of work which can be handled and the high production rate which can be maintained. The machine, once started, need not be stopped until it is desired to change the cutters or to accommodate new work.

The bed ways on which the tables travel are flat, with slight tapers on the inside edges to accommodate corresponding tapers on the bottom of the tables.

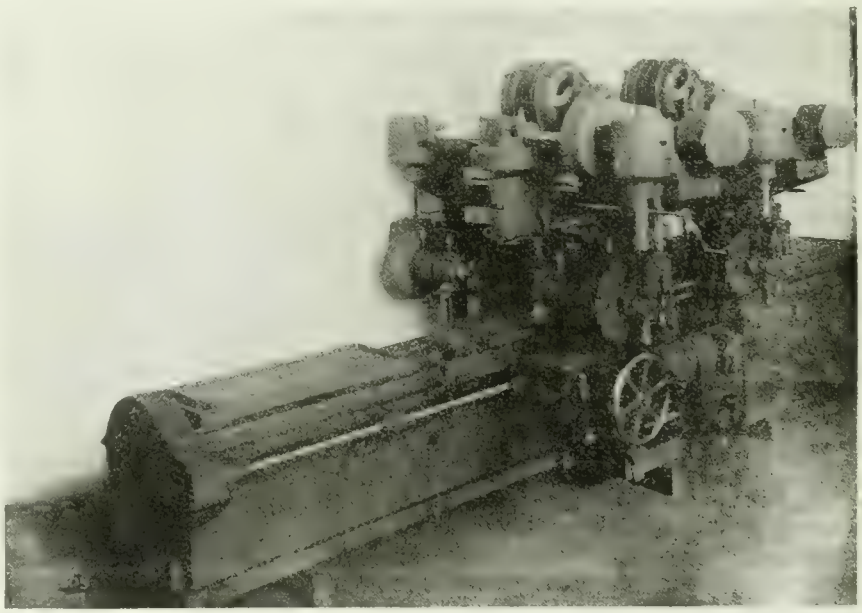
These centre the tables without wedging them, and allow them to be put on and taken off rapidly. The tables hold themselves in position by gravity while travelling, except when passing by the cutters. Here they pass under gibs, fastened to the bed, which hold them against all vertical movement while the cuts are being taken. A feature of the table design is the narrow guide which is tapered as above mentioned. This makes for the maintenance of a greater degree of accuracy through a longer period than the common wide guide. There is a taper gib to take up wear.



GENERAL VIEW OF THE MACHINE.

A feed shaft, which runs the entire length of the bed and is driven on the front end, carries a series of worms spaced at such intervals that the travelling tables are picked up by one worm before they have completely left the other. These worms engage in a rack on the bottoms of the tables. The spacing of the worms makes it impossible to set a table in the wrong position on the bed, and no matter where set it will pick up and travel instantly. The tables have feed in one direction, and fast motion controlled by hand, forward and reverse.

There are four changes of feed through gearing, providing a variation of from approximately 3 in. to 8 in. a minute, with a fast motion of about 12 ft. a minute when the cutters are idle. Two changes of feed are possible through change gears at the end of the gear box and two more are possible through a feed gear shifting lever. The feed and fast motion are controlled by one lever which makes it impossible to get



CLOSE UP VIEW OF THE MACHINE.

both at the same time. The object of the feed gear shifting level is to slow down the feed as occasion may require. The feed mechanism is driven by means of a vertical shaft connected through bevel and reducing gears to the main drive shaft.

Each unit is motor driven. The motor and driving mechanism is carried on the cross rail which is supported by the uprights.

The drive shaft is geared direct to the motor and, through reducing gears, drives the vertical and horizontal spindles. Through change gears which are easily accessible the spindles can be given various speeds.

The heads are of rigid construction, cast in one piece and are adjustable along the ways by means of hand operated screws. Wear is taken up by taper gibs. All have the feature of narrow guide for maintaining accuracy of alignment. When a cutter is located the head is clamped firmly in position.

Spindles are furnished in three standard sizes, the largest diameter in the front bearings being 3⅝ in., 4⅝ in. and 5⅝ in. All sizes can be incorporated on one machine and in heads located as occasion requires. They have hand adjustment in and out of the heads by pinion and rack. The pinion is held in the head and the rack is on the spindle quill. The quill is held in final position by being clamped.

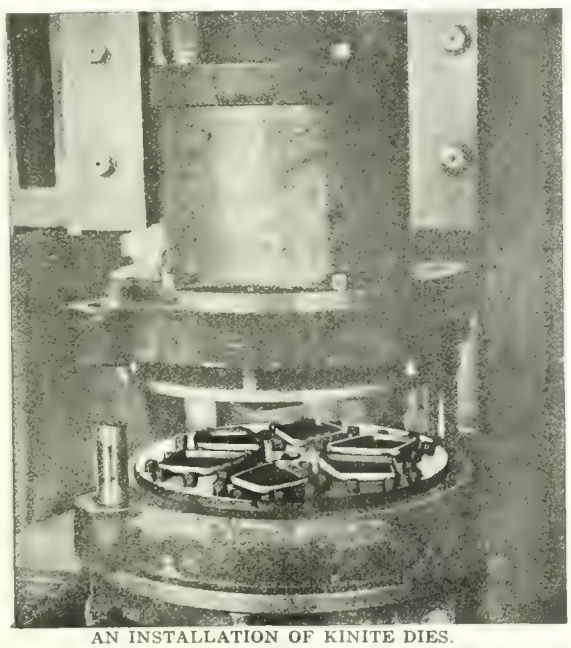
Careful attention is paid to the oiling of all running parts.

The machine is controlled at the unit which carries the feed gears.

Quality of finished work, great rapidity of production and ease of operation are the characteristics of this type of machine.

The machines are patented at home and abroad.

Big Factory for Quebec.—It is understood that the Marceau Oil Cloth Company will shortly erect a factory in the city of Quebec. The buildings are estimated to cost half a million



AN INSTALLATION OF KINITE DIES.

WHAT IS KINITE?

ONE of the recent developments in steels for cutting tools is a patented alloy known as "Kinite," which is especially adapted for making cutters, dies, taps and other tools with multiple cutting edges. It is said that the many kinds of tools required hardening after finishing and which must retain their original shape and dimensions after hardening can be made to last longer and take less labor in finishing when made of "Kinite." Tools of this class are:—blanking, stamping, forming, perforating, drawing and threading dies, and plug surface and snap gauges.

"Kinite" is cast in specially prepared moulds and has the appearance of a good smooth forging. A peculiar property is that it does not elongate under tensile strain or decrease in cross-sectional area. It retains the shape and size that is desired until the breaking point is reached. Castings made from it are free from the defects and blow-holes usually found in a casting. Unlike all other high-speed steels, it contains no tungsten. It will harden better than many forged products, and when hard is very uniform and close-grained, being one of the densest products of the steel family. "Kinite" hardens in oil or air, at a comparatively low temperature, and anneals at about the same temperature. It is high in heat-resisting qualities and does not scale in the fire, which makes it an ideal material for making cutting tools that have comparatively thin cutting edges. It is also valuable for making machine parts that must resist heat and wear, and which are subject to great abrasive action while in service.

"Kinite" castings do not change their form during the hardening process, hence it is possible to make the casting so near the desired shape and size of the finished tool or die that very little machining or labor is necessary to complete it. This fact also makes it possible to produce large dies in one single piece instead of many small pieces where ordinary die steels are used. In the latter case the pieces must be lapped or ground together after they have been hardened to allow for the shrinkage and change in form when hardening.

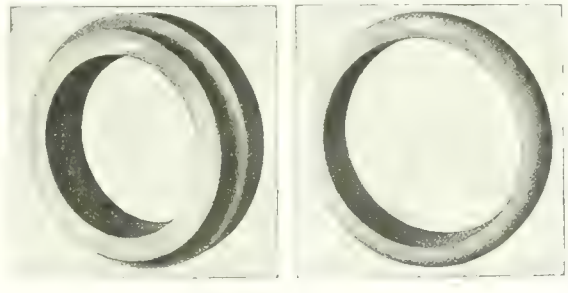
"Kinite," on the other hand, has the unusual characteristic of not changing shape or size during hardening, which saves from 20 to 40 per cent. of the labor necessary to finish dies after they are cast. Further, the purchaser saves considerable metal as no more is used than is actually required for the die (regardless of the shape) plus the small amount to be taken from the cutting edges when finishing. The die being cast to practically the finished size a large amount of stock is saved which ordinarily would be wasted. This saving alone in intricate dies, is no mean percentage of the cost of the die.

Another saving is effected in the labor of finishing such types because all the machining can be done while the metal is soft or in its annealed state. Practically no allowances are necessary for changes in hardening.

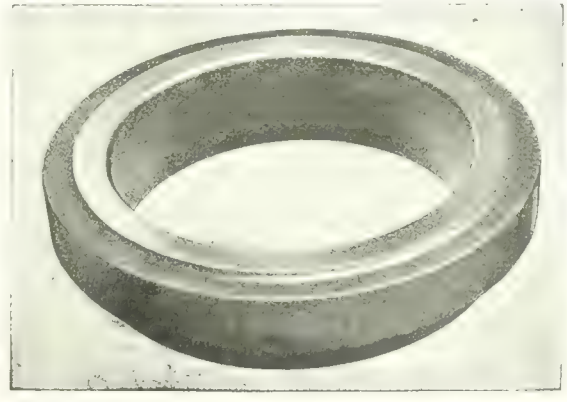
A certain stove company in Cleveland, Ohio, is using a "Kinite" punch and die to blank out stove legs from 3-16 in. black unannealed steel. They have averaged over 200,000 pieces per grind, and the die appears to be good for at least another season.

Some idea of the kind of dies that are

(Continued on page 42)



VIEW OF KINITE DIES.



ANOTHER KINITE DIE.

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The Craze For Factories

THERE are municipalities in Canada that are willing to give the shirt off their back in order to secure industries.

This is not a new disease, but it seems to be like the measles in that there is no telling when it is going to break out in a fresh place.

For a number of years the cry of the municipalities has been, "We must have industries." They have in many cases lost sight entirely of the fact that industries go where conditions are favorable for their development. They fail to recognize the history that has been written all over this country of the fool industry seeker.

There are taxpayers in scores of Canadian villages, towns and cities who are even yet putting up their good money for some idiotic scheme that was foisted on the place years ago, and the only memory they have now is the taxes they pay for their foolishness. It is not correct in many cases to say that these concerns were "hoisted" on the municipality. Too often the municipality was out looking for the proposition. It was a happy time for the promoter who had a real lemon in his pocket. It was not hard for him to find places that would listen to him. He would give employment to one hundred people, he would do this, that and the other thing. Well, if he failed? Municipality had the building or the plant, if there happened to be a plant. They might have an asset and they might not. They certainly had a liability in the money or loan they had made.

But this thing still lives. Only a few days ago a Canadian city had a letter from an American concern. This firm happens to be all right. It has been planning to come to Canada for a branch business to handle export trade. It is coming no matter if the municipalities make concessions or not. If they have to pay their own way they will do it. That firm right now has four wonderfully favorable propositions before it. They are being offered for nothing what they were prepared to pay for.

Here is another and perhaps a more concrete case, because we are able to publish some of the correspondence. In this instance a Canadian city, quite an industrial place, wrote to an American plant, intimating that they had heard they were going to open a business in Canada, and on the strength of that taking the opportunity of pointing out the advantages of this particular Canadian centre.

It was only a few days after that the city received the following letter from the U.S. firm:

"Replying to your letter of the 14th ult., will say, that we now have before us a Canadian proposition, in which this particular city has offered us ten acres of land on a railroad siding and have agreed to build on this land a one-story fireproof factory to contain 30,000 square feet, and turn same over to us, free of charge, and give us water and taxes free for ten years. The Hydraulic Power Co. have agreed to give us electric power at ½c per K.W. hour. In return we are to start operations with at least 100 men and to agree, in case we discontinue during the first ten years, to return the property to the city.

"If you have any better proposition to offer, we would be pleased to receive it, and give it due consideration."

Now there may be some few details that were lacking in the offer that was made to the company. They might have been offered free hay and oats for the first six months, free street car rides for the employees and a twenty per cent. discount on their grocery bill at the corner store.

But after looking over what that Ontario town is prepared to do, one might well be prepared to lean back and say, "If you know of a better 'ole, go to it."

Must Get Started Now

THE more deeply one goes into conditions that have to do with the business of this country, the more apparent it is that fundamentally things are sound.

We are emerging from a period that has been enough to put all kinds of business in the hands of the bailiff. It would seem that every influence in the land has set its hand to creating trouble of one sort and another. There has been an absence of influences and conditions that would usually be looked for when trade was booming.

It is necessary that we should not experiment too long along these lines. It may be the height of folly to try and see how long we can do a fairly good business when conditions are not favorable.

This country has got to get to work. There has been a tremendous amount of labor and engineering power gone to waste in strikes and in fighting them.

These conditions are not the ones that keep business sound. Business probably has kept sound in spite of them rather than with their assistance.

Get to work before there is a crack and a sag. Don't let this period of tinkering be too long drawn out or we may find it hard to stop the thing and put the peg in just at the right place.

THE wisdom of bringing the ex-Kaiser to trial in London is open to question. The war is over, conditions have been dictated by the Allies and Germany has signed. Anything done now would be in the nature of a post-climax. It would give the Kaiser a chance to pose as a martyr, a thing that should be studiously avoided.

* * *

THERE is greater ingot capacity in United States than there is capacity to turn out the finished product. During the war the call was for ingots for forging into shell steel. It is hardly likely that it would be practicable or possible to secure full capacity for the furnaces under these conditions.

* * *

SOME wise men have it all figured out that people should produce more and save more. With the first suggestion no person is going to find fault, but with the latter there is good reason to start an argument. Will some of the wiseacres please go into detail and show how anything can be saved while everything necessary to existence camps on a peak-load basis?

We're All Friends---and We All Profit

By W. H. KELLER

President, Keller Pneumatic Tool Company

TOM CHAPLEY was stumped by a piece of work on the heavy milling machine that he runs. The foreman was busy with some other rush work, so Tom appealed to me to help him adjust his machine. While we worked it out together my shirt lost its dignity.

Meanwhile a business acquaintance dropped in. Someone told him to go right out into the shop. He appeared, greatly surprised; I was oily and disheveled.

"How do you manage to preserve any working discipline when you are so free-and-easy?" my friend inquired. "If I helped out one of my men, he would lose no time in passing the word that it was time to 'jump the old man' for more money."

My friend was right. His men would "jump" him. The difference, as I happen to know, is that my friend commands, while I guide. His office is his office; my office is everyone's office.

We made some big changes when we moved our plant to Grand Haven, Michigan, in September, 1915. Many of the "old timers" came along with us; but we enlarged and eventually took on so many new people that it amounted to a brand-new outfit. We have no moth-eaten traditions to observe; no false ideas of the employer's dignity. We got off on the right foot—on a really friendly basis. There we have stayed ever since.

"Here's how I reasoned out my plan for working with others. I set down the three main points for my attention:

1. The right personal contact.
2. An effective general organization policy.
3. Welfare work that counted for, not against, the company.

The right personal contact between workers and employer is mighty difficult to get. The mere physical task of getting out among the men is easy. But that may be far from real "personal contact."

It depends largely on how much real sympathy the employer has with his workers. Some employers—thrice blessed—are apparently born with this fellow sympathy. Most employers have it to acquire. The employer who cannot acquire it must usually hire some man with understanding and sympathy to represent him to his workers. Workers instinctively recognize real friendship, and as instinctively reject sham. Sham friendship leaves the worker cold; it helps instead of hindering professional labor agitators.

The incident I have related shows my attitude toward the shop boys. It's the same in the office. For example, our business keeps everyone in the drafting room pushing; there is no apparent end to the number of plans and designs we have to turn out, usually in a hurry. It is not uncommon for one or another of the draftsmen to come in and ask me about some point in the work, just as the machine operator asked me about the adjustment

I have never gained the impression that the boys in either shop or office think it strange that I am around them so much. They don't pay any special attention to me; and they never put on the false hustle you see in some plants when the boss happens to make an inspection.

Personal contact with our workers doesn't end when the closing whistle blows. I don't want it to.

We have athletics, encouraged by the company. I play basketball and indoor baseball two or three nights a week in winter, or bowl. Incidentally, the exercise helps keep me in the best kind of physical trim.

We have a considerable number of women workers in our plant. They play basketball, too. I go to just about all the dances in town, and usually dance at least once with each of our girls there. We often have home parties, and I attend when I am invited—which is most of the time.

My personal friendship with the workers is something I would not give up. Never have I been imposed upon; and the familiarity which has been built up has never—as far as I know—held the slightest tinge of contempt on either side.

The general organization of the work—the second point of the three I mentioned—is important. When I say "organization" I cover it by the entire daily conduct and routine of the plant and personnel.

Never, if there is another way out, do I give orders merely as orders. One of our executives remarked the other day that, to hear me outlining the work, he might almost suppose the other fellow was doing the ordering. Perhaps he is right—but the method gets results. Sometimes, even, I can handle it so that the other fellow believes the suggestion is his own. If it happens this way, so much the better.

I want to make one other point about organization, in connection with building pride in the company. I find that one of the best ways to do this is through our advertising. During the past few years we had so many orders ahead that advertising merely to get more was unnecessary. So I directed the appeal in our copy to the men. Many of these advertisements I had framed and hung up around the plant. They had a big effect on general morale; the workers displayed a lot of interest, and commented on them frequently.

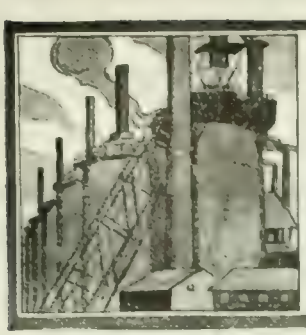
I favor practical welfare work as opposed to the sort which spends a lot of money and gets nowhere. For example, last winter I was told that some local grocers were profiteering. At once we prepared to sell groceries to our people, at cost. The grocers came into line quickly. That's an example of practical welfare work, as I see it.

The first year we came here our gross business was $60,000; last year—our third—it was about $2,000,000. We realized from the start that the best and easiest way to get the friendship of our workers was through friendly co-operation. And the growth of our business has been possible only because the men and women who work in our shops and offices, the men who have invested in this business, and the men who manage it, are real friends.—From *System*.

IF THE best we can do for the foreigner who is regarded as undesirable is to deport him, it is a small tribute to our boasted civilization. Of course, there are cases where no other course is advisable, but have we ever made an honest effort to show the foreigner that we have something better here than he was accustomed to in the land he left?

PORTLAND, ORE., it is reported, will build 5,000 houses to absorb surplus labor. How long will enlightened communities tinker away and simply bridge over conditions that will spring up again when the supposed cure is removed?

IN A Chicago hotel fire 1,700 men escaped in their night attire. In such a case the pyjama habit is much more becoming than the old Mother Hubbard style of nightdress to which some of the sterner sex still adhere.



MARKET DEVELOPMENTS

Old Country Lines Too High to Get Business

They Also Refuse to Put in Tenders as They Are Asked For—Increase in Production of Steel is Well Maintained in Pittsburgh District

IF buying in general were as large as it is with some of the firms in Ontario just now there would be a large volume of business in the iron and steel trade. The firms buying now have Government contracts of one kind and another, and the placing of more ship contracts is going to mean busy days ahead of several of the yards along the Great Lakes and the St. Lawrence.

It is worth noting that British chains and anchors are having trouble in getting into the Canadian market. They were put to the test just this week in a contract, but the business went to a U. S. firm. The price of the Old Country material was about ten per cent. too high, but there is another reason that was against them. There were so many provisions as to price being altered if there were a change of hours, etc., that the figure could not be counted as final. Also the British firms persist in naming a flat price per pound for anchor and chains, combined, while the customer particularly specified that the price on chain and anchor was to be separate. The Old Country firm in question refused to tender in this way and as a result the tender was hardly considered as it could not be compared with other figures that put a price as asked for.

While not looking for higher prices for such lines as sheets, etc., it is worth noting that mills have withdrawn all concessions that have been offered for some time past, and several large sheet mills have withdrawn from the market, booked up for the time at least. One large manufacturer stated this week, "The buyer that puts off too long is going to get left."

Prices on machine tools show no inclination to come down to anything approaching the pre-war state. It seems much easier and more comfortable to stay up than make the effort of a come-down. In fact, predictions of higher prices are freely made.

MONTREAL SCRAP DEALERS AGAIN MARK UP THEIR BUYING SCALE

Special to CANADIAN MACHINERY.

MONTREAL, Que., July 10.—What effect the signing of peace will have upon Canadian business and industry generally, is more or less problematical, as there has been little indication, so far, that the event has been anything more than one of many factors making up the conditions under which we are all working, but it is safe to say that the world at large is more satisfied now that the treaty awaits the ratification of the respective Governments, and when this stage is finally reached, we may look forward to more reasonable consideration of the world's industrial problems. A local steel dealer, recently returned from England, states that conditions there are in a chaotic state and that Canada is fortunate in maintaining the fair state of stability that has been shown since the termination of hostilities. Strike conditions here are still affecting industry, and adjustments are being made in many instances; Canadian Vickers men are still out, but settlement is looked for shortly. Steel requirements are light and dealers, while still optimistic, do not anticipate any marked improvement until the fall. Some little structural material is going, but the demand shows no great expansion in the building lines. As one dealer said: "Manufacturers are only buying to cover their immediate needs. Few are willing to embark on heavy expansion or construction, under existing high costs, with the prospect that building and equipment would deteriorate greatly in value in a few years."

Metal Strength Continues

"Business cannot be said to have shown any marked improvement as a result of peace being signed, but it is undoubtedly true that activity in some lines is of an encouraging character. The movement of metals, while not showing any material increase, is nevertheless of a steady nature and inquiry would imply that the present good demand would continue." This statement, made by a dealer here, seems to characterize the present metal situation. The consumer, it would appear, is still influenced by circumstances and purchases are being made on the basis of existing requirements, little business being placed for future needs. In some respects this might be considered as a good sign, as it would indicate that consumers are not carrying large supplies in face of possible developments. There is, however, little to show that an easier market will arise in the near future; with world business assuming normal conditions, demand for all materials should gradually increase and present high costs of production will virtually prohibit any marked decline in any of the metals with the probable exception of tin, which may develop an easier tone in the coming weeks. Europe's need of copper is well known and a return to normal trading conditions will naturally result in the absorption of large supplies, particularly copper. Montreal dealers are quoting 23 cents for lake copper, and 22 cents for electric and castings, a one cent advance on the week. Tin is firm at 55 cents, with plenty of metal available; trade restrictions are virtually all removed and shipments are quite regular. Spelter and lead are both down ¼ cent, the quotations being 9 and 7 cents respectively. Aluminum demand is steady on a decline of one cent, the price quoted being 35 cents per lb.

Quiet Week in Machine Tools

While business cannot be said to be dull, reports appear to indicate that the past week has been exceptionally quiet, the holiday and the middle summer season being partly responsible for the quiet market, a factor of disinterest seemingly pervading all trade circles. What few sales have been recorded are almost confined to one or two in a lot, and the greater proportion for used equipment. As one dealer put it: "There is generally sufficient to demand our presence at the office, but sales are of a quiet character. While we anticipate better times ahead, these may not materialize for some little time yet."

Steady Demand Maintains Strength

Despite the fact that steel business in this district is below normal, the activity in old material is of a steady character. Local consumption is only fair, but considerable material is going to the States as a result of the better demand from the American mills, many of which are evidently increasing their output. Foundries continue to absorb cast iron scrap, but the volume going in this direction is light in comparison to that of a year ago. Present buying would apparently indicate that little thought is given to future requirements, as the movement of scrap is confined almost exclusively to immediate needs. A factor that assists in maintaining the market at a high level is the fact that much of the material that is brought into the yards is brought in by the small peddlers that go from place to place, gathering up the remnants of the war period. These men insist on high prices for their "product." Dealers take the stuff, knowing that existing conditions point to a period of continued strength, and one that will be further emphasized when developments take a turn for steady and regular expansion. Coppers are quoted up from 1 to 1½ cents, the range being from 13½ cents for light to 17½ cents for crucible. With the exception of zinc, all the scrap metals have been advanced. The same tendency is shown in iron and steel, and advances, while not general throughout the list, are reported on the different lines, principally on boiler plate, malleable and cast iron scrap, the advance being $2, $3 and $2 respectively. Other lines to advance and the current quotations are, heavy melting steel, $12; shell turnings, $7; wrought iron pipe, $9; and stove plate, $15.

SOME FIRMS TAKE IN LARGE AMOUNTS

But the Business in Several Lines is Largely Local Rather Than General

TORONTO.—If buying in general were as good as it is in some local instances there would be a very large amount of business moving in the Dominion just now. As it is buying is very heavy in some lines, and practically at zero in others.

There are several large propositions under way, and announcement of these will no doubt be forthcoming in a few days or weeks now. There is still the same feeling of uncertainty regarding the outcome of the strike in this district. It is poor business that it is not settled, and the continuance of the strike is doing harm to both sides that it will take some time to overcome.

More Railroad Equipment

The western divisions of the National Railways are coming in for their share of attention just now, and big lists have been out for some days, asking for tenders on a list that has some 60 machine tools of all kinds in it. Many of the dealers have sent in their bids for this equipment, and the award should mean good business.

The same buyers are now in the market for the small tools such as drills, taps, reamers, etc., for the St. Malo shops. The lists for the machine tools for this was out some time ago, and the work was pretty well secured between the Canadian makers and the equipment which the Government had on hand in the gun shop at Quebec.

The chances are that there will be some fairly keen bidding for the last list that is out, viz., the drills, taps, reamers and other similar lines. Some of the agents have been waiting for this business to show up for some weeks, and are well prepared to go and make concessions to land it.

There is a fair amount of buying going on now, and some of the machine tool men are well pleased with the amount of business they are securing. There are several good-sized developments under way, and they are going to count largely in the volume of business that is booked. Buildings are being put up to house good-sized plants. As noticed in previous reports there is no material change in the strike situation in this district. It is making the going poor in more ways than one, and business continues to drift into new and strange channels because the people who want work done cannot receive any promises of delivery from the shops. There are rumors, some of them apparently well founded, that say that a settlement is near. Others again say that many of the strikers have left the district to secure work elsewhere.

Concessions are Withdrawn

Prices are firm in the steel market. A. T. Enlow, president of the Sheet Metal Corporation, Hamilton, stated to MACHINERY this week that there was a firmer tone to the market for sheets and kindred lines. "I would not state that we could look for higher prices right away, or even soon," he remarked, "but it is a fact that in nearly all the mills the concessions that have been common for some time have been almost entirely removed, and some of the mills, you will notice, have retired from the market for the time, being well filled with business."

The trouble just now is that buying is too local. Were it as big all over as in some points it would be great. Plates are being asked for in two Ontario shops in very large quantities. In one order there were two items worthy of notice. One was for nine plates with a total weight of 31,000 pounds, another for eight plates that weighed 30,000 pounds. There was enough material to make five cars or so, and the business went through a Toronto warehouse early this week.

Buying In Old Way

"We are buying now as we did before the war," stated on of the warehousemen to MACHINERY this week. "For a long time past nearly all our business has been of the hand-to-mouth sort. We have simply taken the business that came and passed it on to the mills. Now we are buying in quantities that should put our stock in good shape for a quart-

POINTS IN WEEK'S MARKETING NOTES

Pittsburgh reports this week state that the production at the steel mills is sustained and real. Buying is becoming larger and more general.

Warehouse interests in Canada are buying quite heavily now, on much the same plan as they did before the war. They are placing their needs for three months or so, which goes to make up the sort of tonnage the mills like to get.

Montreal scrap metal dealers marked prices up this week. This was not done in Toronto, although dealers in the latter place are ready to admit the strength of the market.

Sheets may not go to a higher figure for some weeks, but it is worth noticing that the concessions which many mills have been in the habit of making are being withdrawn, while a couple of mills have gone off the market for the time, booked up.

The Canadian National Railways are in the market for machine tools for the Western Canadian shops, and for taps, reamers, etc., for the St. Malo shops, equipment for which was placed some weeks ago.

There is a good amount of business in sight in Ontario for the machine tool trade. Of course the used war machinery is still a factor to be reckoned with, but dealers admit readily that it is not bothering them as much as anticipated at the beginning of the armistice.

There are several large firms of boiler and engine builders in Ontario that are placing very large orders for steel this week. A large tonnage is involved.

er. Deliveries are spread over this time and will be more or less protected against any increase in price. We do not look for a decline at the present time. In fact prices are firmer, and the man who is putting off his buying is going to be left."

The Old Country Trade

One contract that came up a few weeks ago, and tenders for which are placed this week, called for chains and anchors. Bids were asked from Old Country firms by their Toronto agents, but there is very little chance of them securing the business. In the first place they are high in price, and in the second place they will not place their tenders as they are asked, in order that comparisons may be made with bids from the States. "There were too many qualifying clauses in the English tender," stated the Canadian firm handling this line. They had provisions that meant that their price was off if changes were made in hours of work or half a dozen other things. In fact their bid was not definite enough to put in. Then again the English concerns insist on putting in their bids their own way. They lump the chains and anchor, and put in a price to cover the whole equipment, whereas the firms buying in this country ask for and insist upon a price per pound on chains and a price per pound for anchor. The Old Country houses will simply let us go by the board rather than make the concession."

It is understood that the British firms are still quoting about ten per cent. too high, and, in consequence, the business, or all of it that does not specify Old Country lines, is going to U.S. points.

The Scrap Metal Markets

There is a movement on the part of some of the dealers to let go of a considerable part of their holdings. They figure out that prices are not going to jump very much higher, especially in coppers. In fact it may be that they are now near the level that will make about as good selling as can be expected for some weeks.

Fairly large shipments of iron and steel are being made to the U.S. market. Canadian mills and foundries are not taking up very much material.

STEEL MILL OPERATIONS ARE NOW GETTING CLOSE TO CAPACITY AGAIN

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., July 10.—Pig iron production in June was at the rate of about 26,100,000 tons a year, the rate showing an increase of an even million tons over the rate in May. This is the first increase in pig iron production since before the war ended. Last September the record rate was attained, 41,900,000 tons, and month by month thereafter there were successive decreases. The turn has now been rounded. It is possible, however, that July will show little if any increase over June, because midsummer brings such high humidity, cutting down individual blast furnace outputs. There is, at any rate, a greater furnace capacity in blast than the average of June.

A curious feature of the showing for June is that the increase in output over May was almost entirely on the part of the merchant furnaces. There was no material increase in the number of merchant furnaces in blast, and the conclusion is that in May some of the merchant furnaces in blast did not produce their full outputs, being gated down, something that is quite feasible with a well built and managed stack. The merchant furnaces have been quite opposed to piling iron. Many merchant furnaces are idle and they will hardly get into blast until they are certain of being able to dispose of their output substantially as fast as made. At the moment there is no such prospect, since the recent buying movement has played out, and, while the furnaces in blast are comfortably filled with orders through the third quarter of the year, and into the fourth quarter, the consumers are no doubt covered in a corresponding way for their requirements. An increased demand for their products is requisite for the development of another buying movement in the near future.

Mill Operations Increase

Steel mill operations on July 1 were running at the rate of fully 65 per cent. of capacity, and there has been a slight further increase since then. A 70 per cent. rate may be attained within two or three weeks as there is a continued tendency to put more capacity in operation since the orders received have been consistently running ahead of the shipments made. The low point in operation was about 50 per cent., at the middle of May, the month as a whole showing an operation of 54 per cent., against 65 per cent. for April, and an estimated 60 per cent. rate in June, the official figures for June not being available as yet.

Now that steel mill operations are increasing, and so sharply, the fact should be pointed out that a 100 per cent. operation, on the basis of the monthly reports used for computing these percentages, is in all probability not necessary to bring about full operation of the steel industry as a whole. The only production reports made are of steel ingot production, but steel ingots are not an ordinary commercial proposition. The demand is for finished steel products, in the various forms of bars, shapes, plates, sheets, wire, etc., produced from ingots through the various finishing processes. It is practically certain that the capacity for producing steel ingots is in excess of the absorbing power of the various finishing departments, this arising from the fact that during the war many additional open hearth furnaces had to be built to produce ingots, on account of the heavy demand for shell steel, which was not rolled through any of the regular finishing channels. The result is an unbalanced industry. In ordinary times the total of finishing capacity has exceeded the ability of the steel departments to produce the raw steel, an excess being necessary because in one year the demand might run more heavily to certain products, and in another year it might run more heavily to others. Steel ingot capacity increased from 35,000,000 tons a year in 1914 to 49,000,000 tons at the present time, or 40 per cent., whereas outside the building of many plate mills there was but little increase in steel finishing capacity. While it is very difficult to estimate, it is probable that the various finishing departments, excepting the rail and plate mills, would probably be filled up solidly before the requirements in ingots ran beyond 85 or 90 per cent. of the capacity. If so, one does not need to look for steel mill operations to attain one hundred per cent. before there is full activity. Taking it that ingot production was 50 per cent. of capacity at the middle of May, and 65 per cent. on July 1, the increase in that short space of a month and a half represented between one-third and one-half the total progress necessary to bring virtually full operation to the steel industry as a whole.

Little Effect from Midsummer

Almost invariably the steel market slows down for July and August, the midsummer months. This year no such seasonal influence has been felt, thus far at least. This is regarded as indicating that business is so ready and anxious to go ahead that it cannot take a vacation, but even if there were some slight relaxation at this time it would be only temporary.

Furthermore a few branches of the finished steel trade are now so well filled with business that they can take no more for early delivery. The butt weld departments of the pipe mills are sold up solidly for several weeks, and the wire mills are practically sold up, particularly on nails. In sheets there is a very fair volume of business on books and delivery promises have lengthened. But before the end of June sheet mills began advising their customers to place specifications for August rollings if they wanted to insure against disappointment.

Labor Supplies

For two or three months past there have been predictions that eventually a labor shortage would develop as manufacturing and building operations should expand, but there was an indisposition to set a definite time for the shortage to develop. Now it is the common observation that the shortage has very nearly put in an appearance already.

There is very little unemployment, yet there are orders on the books of mills and factories and contracts for construction jobs let that will involve the employment of more and more labor week

by week. In addition to increasing employment there is more and more emigration, and some mills have found by making actual canvass among their employees that very considerable percentages of the foreign born intend to go to the lands of their birth as soon as circumstances permit. All talk of prospective wage reductions has, of course, disappeared, and here and there wage advances are occurring.

THE TURN UPWARD HAS AGAIN BEEN MADE IN PIG IRON MARKET

AFTER a steady decline in the output of pig iron since September last, when it reached its highest peak, the turn has again been made upward. The output for June was the highest for any month since that date. Following are reports from various U. S. points:

Pittsburgh.—A slackening off in the market for foundry iron has been noted this week, the reason being that most makers have covered their requirements for the last half. There is no demand so far for Bessemer or basic grades. Prices are keeping firm, with basic at $25.75.

Chicago.—After a heavy rush of business during June, the market is going through a period of rest. It is held that many makers were conservative in their buying for last half, and will have to come into the market again. Enquiries for small lots up to 1,000 tons are still coming in for foundry grades.

Philadelphia.—There is a disposition on the part of some furnace interests to blow in idle stacks as soon as business offers, and this will tend to keep prices from going up. There is one sale of basic reported between 6,000 and 7,000 tons at $26 furnace. Enquiry is weak for foundry grades.

Buffalo.—After the first three weeks heavy buying the last week of June showed a falling off, and the past week's sales have fallen off still further. Third and fourth quarter requirements are responsible for a fair enquiry for foundry grades. The March 21st schedule is being maintained, and the outlook is held to be good.

Cincinnati.—Quite a few sales of small lots, averaging about 500 tons, were made for last half shipment, mostly to Ohio smelters. Sales generally were considered good, but the enquiry is not very brisk. Another furnace will be blown in shortly.

Birmingham.—The demand in this district is keeping steady, and the Republic is reported to be about to blow in another stack. A good volume of sales has been made for fourth quarter, and a large interest is said to be fully stocked up for the last half of the year. The output of iron castings is increasing.

St. Louis.—There have been no changes in price though the market still continues dull. Neither sellers or smelters are willing to engage themselves very far ahead, and it will take an active general movement to make any change.

New York.—A period of quietness has apparently set in in this district. For No. 2x $27 Buffalo is quoted, and the same grade of $28 eastern Pennsylvania. Till ocean freight rates are better export business is stagnant. One sale of 250 tons for Dutch East Indies is reported.

Cleveland.—There has been an easing up after the brisk market movement of the past few weeks, but a fair volume of business was done during the week. Foundries seem to keeping pretty busy, which is keeping up the demand for pig iron. Steel making grades are not in demand.

SCRAP MARKET NOT DOING SO WELL AS IT WAS A WEEK OR SO AGO

The market for foundry scrap is dull, trading being confined mostly to dealers. However, there is a pretty widespread demand for the steel making grades. Following are reports from United States points:

Pittsburgh.—A strong demand for steel making scrap and a short supply are the market features in this district. Heavy steel, borings and turnings are all eagerly sought. The foundry grade is not asked for. Heavy melting steel has sold at $19 per gross ton delivered.

Chicago.—Dealers are buying up Government and railroad scrap as it is offerred at prices which are steadily advancing. Dealers are holding on to their stock in expectation of further advances, but the opinion of the consumers is that prices are too high. This keeps trading within very confined limits.

Philadelphia.—Considerably over 5,000 tons of heavy melting steel has been sold at a price of $18 to $18.75 delivered. Low phosphorus melting scrap is quoted at $23 to $24 delivered, if guaranteed .04 or under in phosphorus. Steel rails for rerolling are quoted at $18.50 to $19.50 delivered.

Buffalo.—With no demand from consumers in the district to or from outside points dealers are doing all the buying in sight. They seem to have no doubt about being able to dispose of their stocks at an advance. Heavy melting steel is quoted $16.50 to $17 f.o.b. Buffalo.

Cincinnati.—With a good demand and improving business nearly all grades of scrap advanced in price last week. Steel rerolling rails are in good demand as is also No. 1 railroad scrap. Heavy melting steel is quoted f.o.b. dealers' yard $14.50 to $15.

New York.—An increase in all grades, but chiefly in heavy melting steel, is noted here. The latter has jumped around $1 per ton in the last week. A 2,000 ton lot of mixed scrap, including about 60 tons copper wire, brought a bid of $20.36, f.o.b. Morgan, N.J.

Cleveland.—A dealers' market in heavy melting steel borings and turnings obtains in this section. Dealers are paying $19 per ton for heavy melting steel, but mills will not offer more than $18.50 for the same grade. Prices are holding firm. $21 is reported to have been paid for low phosphorus melting scrap.

Birmingham.—With consumers pretty well stocked up, the market is dull, and no immediate betterment is looked for. Steel rails are quoted at $12 to $14 per gross ton, and cast iron borings at $6.50 to $7.50.

St. Louis.—From this centre comes the report that the only market is a dealers' market. Scrap offerings have been light at the latter end of the month, but lists put out earlier brought good prices.

BIG FRENCH CONTRACT

Rebuilding of Nancy to be Undertaken —Price is About $250,000,000

A contract for the reconstruction of buildings, bridges and other structures in the district of Nancy, France, has been entered into between the Vulcan Steel Products Company of New York and a committee representing the French Government. McArthur Brothers, one of the largest railroad contracting firms in this country, have received subcontracts covering the excavation and masonry involved, while the McClinton-Marshall Construction Company will supply the bridge and structural steel work. The minimum amount named is $250,000,000, but it is understood that this only a tentative figure and that the final sum involved will probably be considerably more.

Negotiations had been entered into between the committee of Nancy and Rodney D. Chip, general manager of the Vulcan Company, and the contract was signed about a month ago. On account of the size of the project it is not believed that operations will begin before next spring.

At present exchange with this country is heavily against France and with the hope of bolstering the rates, which have declined during the last three months to a point not reached during the war, the French Government has been loath to allow any dealings which would involve further payments to this country. Imports are being strictly controlled and for this reason the announcement of the signing of such a contract was received with some surprise by the financial community.

It is understood, however, that all obstacles have been overcome. The in-

Continued on page 42

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

Lake copper	$23 00	$21 00
Electro copper	22 00	20 75
Castings, copper	22 00	18 00
Tin	55 00	55 00
Spelter	9 00	8 50
Lead	7 00	6 50
Antimony	9 50	9 50
Aluminum	36 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$13 50	$12 00
Copper, crucible	17 25	15.00
Copper, heavy	17 50	15 00
Copper wire	17 50	14 50
No. 1 machine composition	13 50	14 00
New brass cuttings	10 00	9 00
Red brass cuttings	11 75	9 00
Yellow brass turnings	8 50	6 50
Light brass	7 00	5 00
Medium brass	8 00	6 00
Scrap zinc	5 50	5 00
Heavy lead	5 00	4 00
Tea lead	4 00	3 00
Aluminum	16 00	12 00
	Per Ton	
Heavy melting steel	12 00	9 00
Shell turnings	7 00	6 00
Boiler plate	12 00	8 00
Axles (wrought iron)	17 00	15 00
Rails	12 00	11 00
Malleable scrap	15 00	12 00
No. 1 machine cast iron	20 00	15 00
Pipe wrought	9 00	5 00
Car wheels	20 00	18 00
Steel axles	20 00	20 00
Mach. shop turnings	5 50	5 00
Stove plate	15 00	10 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and emi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts,	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws ..... list plus	20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per Ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sies up to 52	40
S.S. drills, wire sizes, No. 53 to 80	40 plus 10
Standard drills, al sizes	40 plus 10
3-fluted drills, plus	10
Jobbers' and letter sizes	40 plus 10
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	20 to 50
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No 28	.....	.....
Premier, No 28 U.S.	.....	7 50
Premier, 10¾ oz.	.....	7 80
Zinc sheets	20 00	20 00

PROOF COIL CHAIN B

¼ in., $14.35; 5-16 in., $13.85; ⅜ in., $13.50; 7-16 in., $12.90; ½ in., $13.20; $13.00; ⅞ in., $12.90; 1 inch, $12.65; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $13.00; 3-16 in., $12.50; ¼ in., $11.75; 5-16 in., $11.40; ⅜ in., $11.00; 7-16 in., $10.60; ½ in., $10.40; ⅝ in., $10.00; ¾ in., $9.90.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11
Dark colored	09
Mixed colored	10

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	-
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

demnity due from Germany under the peace treaty is understood to be the source of the funds which will be used in making payment for the work and it is believed that the Government of France will issue some form of security in anticipation of the indemnity payments. The du Pont interests are arranging the transaction's financial details.

The city of Nancy, just behind the battle line, sustained considerable damage from air raids, though the Germans never turned their artillery upon it, probably because they counted upon possessing the city after the war and did not wish to damage it. The neighboring district, however, sustained great damage.

SHIP CONTRACTS TO BE GIVEN OUT

Statement From Ottawa About Building To Be Carried on This Season

According to information received from the representative of CANADIAN MACHINERY at Ottawa, the Government will shortly give some more contracts for ships to the Collingwood Shipbuilding Company, and the Dominion Shipbuilding Company. They will also give some to another of the St. Lawrence yards.

SERIOUS EFFORT NEEDED ON PART OF CANADIANS TO GET CHINESE TRADE

IT is quite evident that Mr. Ross, Canadian trade commissioner for China, is not greatly impressed with the seriousness of the efforts that Canadians have made in the past to go into the great Chinese market and sell goods to the millions of purchasers there.

This fact and others came out in an interview which CANADIAN MACHINERY had with Mr. Ross during a short stay in Toronto a few days ago. "There is too much pressure on the land in China," remarked Mr. Ross, "as fully 80 per cent. of the four hundred million people live off the land. They have not developed their natural resources to any extent. There is going to be a development in China. I am not disclosing any secrets when I say that certain powers are going to take China in hand," continued Mr. Ross, "and there will be loans made for development purposes."

"What about the machinery situation?" inquired the reporter.

"There will be a market there—in fact it is there now," he replied, "for mining machinery, cotton and flour mills. There are large engineering firms at Shanghai and Hong Kong. There is no reason why our engineering firms should not go into that field and get a fair share of the business that is offering. There will be bridge building to be done on a good scale and other works of a similar nature. Canadians going into that field will understand, of course, that they will have to compete with the world. In such a field they could ask no favors, and they would not be under any particular handicaps. It is as easy to send material to China from Canada as from England. The Chinese market requires steel bars for reinforcing, corrugated sheets, tin plates, wire, nails."

Mr. Ross made it plain that in many lines the goods sent to China would have to be made down to a price. This did not hold good in reference to machinery, and he advised that no Canadian dealer or maker should risk his reputation by putting a machine in that country that would not stand up and do the work. Japan had ruined her chances by this very thing, trying to put inferior material off on the Chinese trade.

"Above all else," concluded Mr. Ross, "the Canadian trade has got to make up its mind to get closer to the people of China if they are going to sell to them. It is no use standing ten thousand miles off and dangling the goods in the air. There has never been a serious, concerted effort to capture the trade of that great nation. The Canadian manufacturers have never yet got down to hard pan in this matter. In less than a quarter of a century China will be one of the greatest customers in the world. The English language is all that is necessary to do business with. The opportunity is there, but it is up to the Canadians to get together and seriously enter the Chinese market." Mr. Ross intimated that he was only too pleased at all times to help the Canadian trade, and answer all inquiries about the Chinese field. He can be located by addressing the Department of Trade and Commerce, Ottawa.

PRICES WILL NOT BE LOW

"I am rather a firm believer in the natural economic laws, and I do not find myself in accord with the impression that many people seem to have that the level of prices is not likely to be radically changed over the decade," said John D. Ryan of the Anaconda Copper Co. "I believe that prices must be made that will equalize consumption and production.

"We have seen some sharp adjustments already from war prices, and in every product in which the companies with which I am connected are interested prices have gone back to pre-war averages, and in some cases lower. These products are copper, zinc, lead and manganese.

"I do not believe that the level of prices will fall permanently as low as before the war, but I am convinced that we can now look for gradual adjustments in most staple products. I think prices will have to be put where building and development of all kinds must be encouraged before we will see consumption approach production of the staples.

"I think in the adjustments which are necessary labor will have to contribute its share or unemployment on a very serious scale is bound to result. I hope, however, that the intelligence and foresight of those who have to settle these questions will be such that every consideration of the needs of those who work for wages and salaries will be considered before profits, and that reductions in wages will take place only where it is imperative."

WHAT IS "KINITE"?

Continued from page 33

readily made of "Kinite" can be gained from the accompanying illustrations, which show the rough castings for a large circular die for drawing milk cans. The finished die, shown in the larger illustration, weighs 141 pounds, is 13 in. inside diameter and 4⅞ in. deep. The mean out-of-round, after hardening, was .003, a change so slight that no grinding was required, and as the surface was smooth, showed absolutely no scale, and was so near the required size that it was used just as it came from the fire without any additional work.

A superintendent of a large metal stamping company has been using "Kinite" dies for several years. On a job requiring three "Kinite" dies two of them were in perfect condition after drawing 116,627 pieces, while the third broke off at the point on the 94,227th piece. With regular carbon steel he averaged only 22,000 pieces on the third operation, when it was necessary to rework.

Another "Kinite" die, which he uses for forming a handle from 16-gauge sheet iron, has run 75,000 pieces thus far and shows no wear at all. With regular carbon steel reworking is necessary after 25,000 pieces.

The Kinite Company, of Milwaukee, who handle this product, state that further information will be gladly forwarded to those interested.

Help for Farmers.—The present situation with regard to farm help shortage in Brant County is so acute that the Brantford Chamber of Commerce has appealed to the manufacturers of Brantford to draw this matter to the attention of their men during stocktaking, or when men are let out for any other reason. It is emphasized that wages being paid in the country at the present time are equal to city wages.

INCORPORATIONS

The Alberta Pioneer Canning Co., Ltd., has been incorporatde with a capital stock of $40,000 in 800 shares of $50 each. The company will carry on the business of fruit packers, etc., and the head office of the company will be in Edson, Alta.

The firm of Doheny, Quinlan & Robertson has been incorporated with a capital stock of $2,000,000 in 20,000 shares of $100 each, the head office to be in Montreal. The firm will carry on the business of general contractors and engineers.

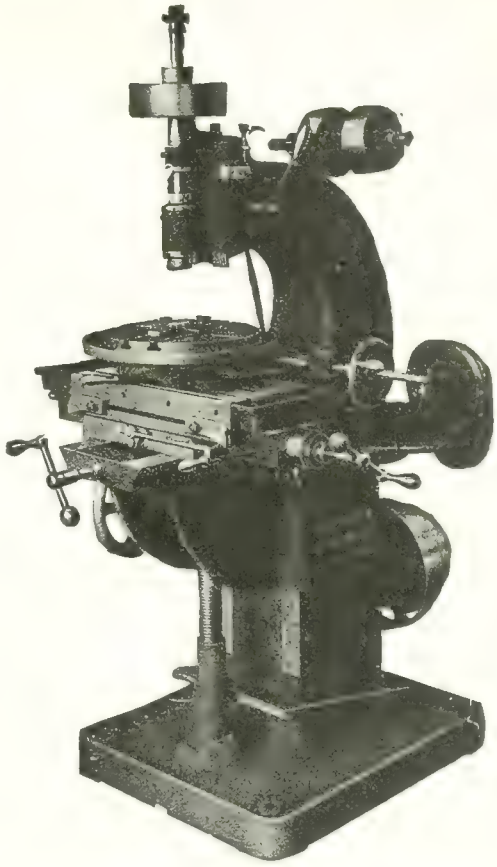
BECKER

Belt Driven Millers

The Machine that Gives the Smooth Finish

Stringent shortage of labor during the war put a premium on machinery of superior productive ability. Never was the capacity and value of Becker Millers better emphasized than during that period. And Becker Millers will always continue to demonstrate their ability to return maximum production for minimum expenditure of manual effort.

Send us blue prints of your work and other data and we will submit estimates on Becker production. Adopt this "safety-first" course; it may mean added profits to you.



The A. R. Williams Machinery Co.

LIMITED, TORONTO

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal

Head Office: 187 Delisle St. MONTREAL

Phone Victoria 1492

MORROW SCREWS MORROW

DRILLS FILES

MORROW NUTS MORROW

MORROW INGERSOLL

In assembly you should use only the best "Morrow's."

Best Jobbers carry "Morrow's."

Set Screws, Cap Screws—"It's the finishing die that does it."

Nuts (every variety of finish).

Twist Drills, "will do more drilling with less regrinding."

Order Ingersoll Files from us, "they cut faster and wear longer."

John Morrow Screw & Nut Co.

LIMITED

INGERSOLL - CANADA

Always, everywhere, use "Morrow" products. Made just a little better than seems necessary.

WELDER IN R. R. SHOP AT NEVERS, FRANCE, RECEIVES D.S.M.

When America put her strong hand to the task of war, nowhere did her effort tell with greater effect than in the great car shops where the men who had linked two oceans and laced a continent with steel, pulled denims over their O. D.'s for the fight behind the lines.

One of these men, Buck Private Matousek, now master engineer, wears the Distinguished Service Medal, and wears it with the satisfaction of knowing that the work he did amid the roaring machines of the great shop at Nevers was worth as much to his country as many a deed of glory at the front itself. Matousek was the man who, upon his own personal initiative, and thanks to his peculiar skill as a welder, saved many thousands of dollars and many thousands of still more precious moments by healing wounded locomotives and putting them back to active service.

The war couldn't have been won without locomotives, and without men expert in the operation and repair of locomotives. What American railroaders and machinists accomplished in France astounded the French railroaders and mechanical experts. It was one thing to bring to France an enormous number of locomotives and cars, together with ample equipment. It was another thing to keep not only these locomotives and cars but many of those of the Allies in order.

One powerful locomotive could haul dozens of cars of munitions to the front. For every locomotive that was put out of the running and stayed out of it, dozens of cars of food, equipment and shells, needed at the front, had to stand still on a side track.

Under the terrific strain of war work the blown-out cylinder was a frequent occurrence. To wait for new parts meant interminable delay. And here Matousek stepped in and, despite the doubt and skepticism of some of his superiors, undertook to repair the breaks himself. He succeeded, and with such results that his work soon took on an importance that it resulted in the award of the D.S.M.

Instead of lying idle for weeks, locomotives that needed new cylinders were ready for action in four hours. Kneeling on the concrete floor, directing the white flame of his oxy-acetylene welding torch with the artistry of an expert, Matousek kept the wheels moving that carried the munitions and the supplies to the men in the forward lines.

Here at the great A. E. F. railroad shops of Nevers, America's effort is still visible. The buildings were made the repair headquarters of locomotives in 1918 and were turned over to the Americans for equipment. This they did with the finest equipment from the shops of the country that lead the world in railroading.

And now, with the war work over, American ingenuity is utilizing the plants as a school of instruction.

From all parts of the A. E. F. hundreds of students have come to Nevers. These men are receiving instruction from such experts as Matousek. The work of the shops goes on, and, right with it, the school work. The students act as apprentices and helpers. They are taking courses in welding, machine shop practice, tool making, heavy railroad blacksmithing and forging, foundry work, railroad electrical work, and other lines. And instead of delaying production, they are actually increasing it.—"Stars and Stripes."

BOOK REVIEW

The Construction of Graphical Charts, by John P. Peddle. The McGraw Hill Book Co. Price $2.

Much of the work of calculation done by the engineer and designer is in the repeated calculation of a limited number of formulae to a variety of different conditions, which involves merely the substitution of different variables in identical equations. Any mechanical means for performing this operation expeditiously will not only lead to a saving of time and mental wear and tear but will also minimize the chances for error. Such a device is the chart or nomagram, and the present work enters into its construction in a very clear and practical manner. Believing that the subject should be particularly useful to the practicing engineer who is often a trifle rusty in some parts of his mathematics, an effort is made to simplify the mathematical treatment. A series of illustrative problems has also been worked out in detail as it was thought by the author that these would afford a clear insight into the methods and a better understanding of the difficulties likely to be encountered than would be possible from a purely theoretical analysis. In the second edition of the work now presented a chapter on the use of determinants, in the plotting of graphical charts, has been added.

Contents

Charts plotted on rectangular coordinates; the alignment chart; the hexagonal index chart; proportional charts; empirical equations; stereographic charts and solid models; the use of determinants.

—From the "Passing Show" (London).

PLAYING POSSUM.
Germany's Statement to Her Creditors.

INCORPORATIONS

The Andian National Corporation, Ltd., has been incorporated with a capital stock of $1,000,000 in 10,000 shares of $100 each. The object of the company will be to search for minerals, oil, gas, etc. The head office of the company will be in Ottawa.

The United States Rubber Co., of Canada, Ltd., has been incorporated with a capital stock of $20,000,000, divided into 200,000 shares of $100 each, the head office to be in Montreal. The company will manufacture and deal in all kinds of rubber goods. The principals are Alexander Chase Casgrain, Errol Malcolm McDougall, Leslie Gordon Bell, Sadie Conrad Demers, and Edward James Waterson.

William Simon Morlock, Sydney Ellis Wedd, Roy Beverly Whitehead and Bruce Victor McCrimmon, solicitors, and Samuel Davidson Fowler, solicitors' clerk, all of Toronto, have been incorporated under the name of the Allied Packers of Canada, Ltd., with a capital stock of $10,000,000 in 100,000 shares of $100 each to deal in hogs, cattle, etc., and make food products of various kinds. The head office of the company will be in Toronto.

PHILADELPHIA FOUNDRYMEN'S ASSOCIATION

The above association held its 228th meeting at the manufacturers' Club, on Wednesday evening, June 4, 1919, at 8 o'clock, this being the last meeting until September.

The program for the evening was as follows:

H. A. DeFries, chief engineer of Hamilton & Hansell, Inc., Park Row building, New York, showed slides and gave a talk covering the Rennerfelt electric arc and melting furnace for melting steel, brass, copper, nickel, ferro-manganese, etc.

He based his explanations chiefly on the points of applying the proper way of electric heating at the proper moment. These points were not included in their last address.

Don't forget the A.F.A. and foundry exhibit beginning the week of September 29, at the Commercial Museum, 34th and Spruce Streets, West Philadelphia.

It will be the greatest event of the foundry world, as England, France and Italy will be there to show America what they learned in foundry practice during the world war.

The members of this association will give the delegates and their women folks a most cordial welcome.

The above is respectfully submitted.

THOS. DEVLIN, President. HOWARD EVANS, Secretary.

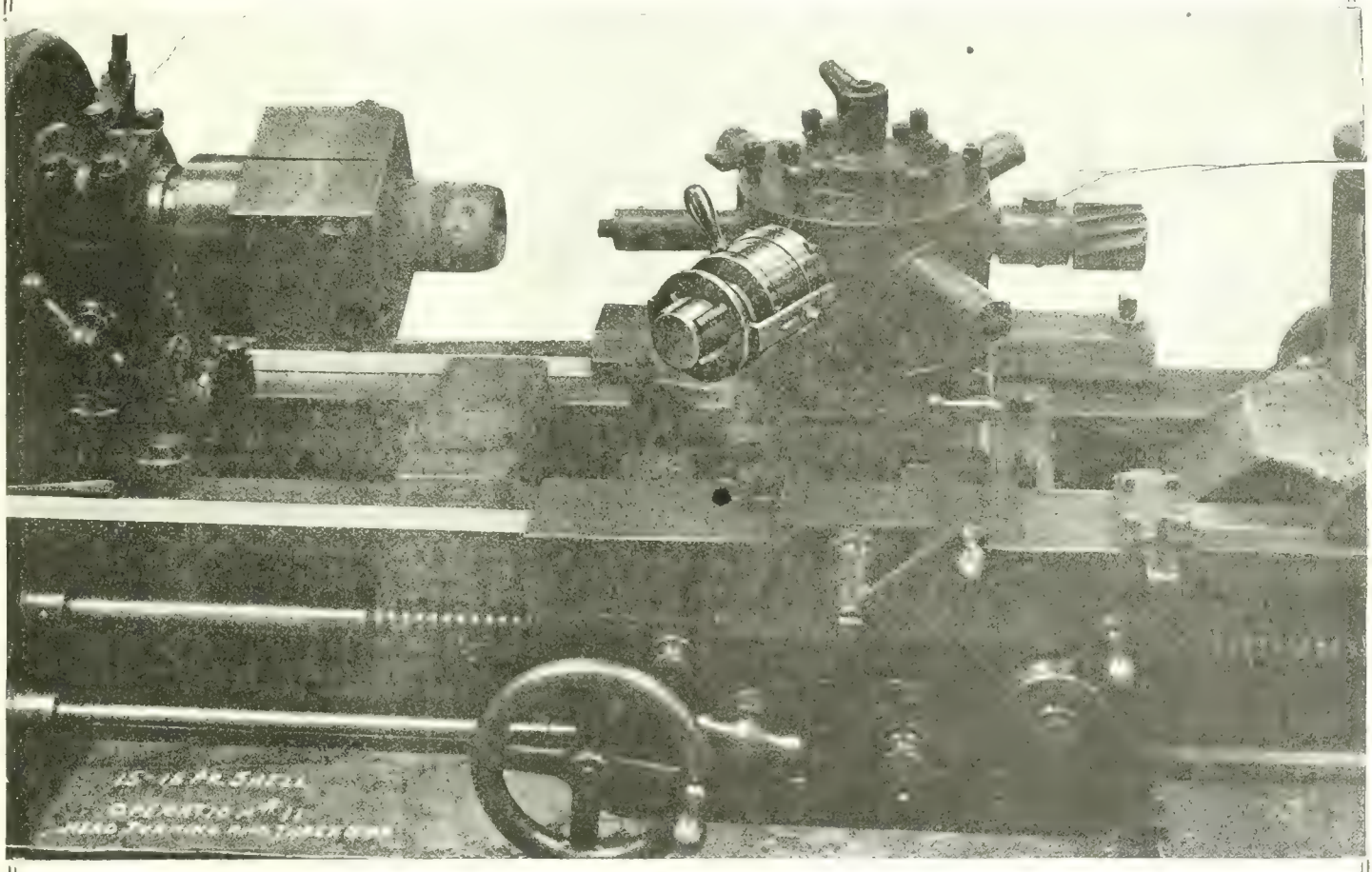
ANOTHER GEOMETRIC FEAT

DESCRIBED IN A LETTER FROM CANADA

Messrs. Geometric Tool Company,
New Haven, Conn., U.S.A.

Gentlemen:—

"The engine lathe shown in the photograph which we are sending you commenced work on shells within four months of the start of the war, when methods were in course of development, and special machines were unknown. Material and labor were both frequently unsatisfactory. Rejections due to poor threads were



frequent troubles with shell makers. Despite many adverse conditions the contract was successfully completed, and the Geometric Tap used on this lathe (fitted to cross-slide on carriage) was an important contributing factor in the good work done in the early strenuous times."

Very truly yours,

Whether yours is a tapping or threading job, or both, you would be satisfied with the Geometric way of doing it.

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal. **The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.**

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

MUNICIPAL

Ottawa.—The proposed new Cummings bridge will cost about $200,000.

Simcoe.—The public utilities commission is going to buy a centrifugal pump for sewage disposal work.

Chatham.—An engineer is to be engaged to go over the situation here and report on the best plan for a waterworks system.

Elora.—Tenders are being received for a steel bridge 75 feet long over the Grand River. S. Aitcheson, reeve of Pilkington, is the party to address.

TENDERS

The Ministry of Lands and Forests will receive tenders up till the 16th July, for the right to cut timber on Groves and St Louis Townships, in the District of Sudbury. All particulars can be obtained from the Minister or from Mr. Charles Henderson, Crown Timber Agent, Sudbury.

The Manitoba Department of Public Works will receive tenders up till July 10th for materials in connection with construction of a transmission line between Winnipeg and Portage La Prairie. All information can be secured from J. M. Leamy, Engineer of Mechanical Services, New Parliament Buildings, Winnipeg.

The Galt Housing Commission are asking for sealed tenders for all trades required in the erection of fifty houses, half to be of four rooms and half to be of six rooms. Alternative tenders for one hundred houses, half to be four and half to be of six rooms, are also asked. Plans and specifications can be obtained from Messrs. Evans & Hall, 30 Water Street, Galt, Ont.

Tenders will be received, by registered post only, addressed to the Chairman of the Board of Control, City Hall, Toronto, up to noon on Monday, July 21st, 1919, for the construction and delivery of 16-inch lapwelded steel pipe. Specifications and tender forms for the foregoing may be obtained upon application at the office of the Water Main Extension Section, Department of Works, Room 320, City Hall, Toronto.

TRADE GOSSIP

New Pulp Mill.—Advices from Bear River, N.S., state that work has started on the new mill for Clarke Bros. The buildings will consist of a pulp mill, saw mill, boiler room and machine shop.

London's Motor Industry.—The Republic Motor Truck Co. of Alma, Mich., are planning the erection of a factory in London, Ont It is understood that the buildings will cost in the neighborhood of $500,000.

Factory Extensions.—Two Arnprior firms are making plans for extensions and additions to their factories. The Arnprior Cabinet Co., Ltd., are about to make two additions to their present plant, and F. C. Hyck & Sons are making extensive alterations to their premises.

New Firm Incorporated.—The New Brunswick Typewriter & Specialty Co., Ltd., with a capital stock of $24,900, and headquarters at St. John, N.B., has been incorporated. The principals are H. C. Parker and C. F. Wetmore, both of St. Johns, and Pearl Soulis, of Halifax.

The Bastian-Blessing Company, Chicago, have issued a booklet on the Rego welding and cutting apparatus, which goes into the details of this equipment in a very thorough manner, and lists, together with the prices, the various types of complete welding sets and torches made.

Lumber Prices Increase.—An increase of $2 per 1,000 feet in all grades of lumber is in effect This is due, it is alleged, to the appearance of American buyers in the British Columbia market, who are competing with Canadian dealers, thereby enhancing the market value of the lumber.

Going Ahead.—The R. McDougall Co., Ltd., Galt, were not seriously inconvenienced by the fire which took place in their plant recently. The machine shop and foundry were uninjured, and the patterns that were burned or injured have been largely replaced. Their deliveries on their usual lines have not been interfered with.

Praise for Board.—The British Minister of Munitions has sent a cable to the Imperial Munitions Board congratulating them on the report of their war expenditures. The British comptroller and auditor general report that the accounts of the I.M.B. are highly satisfactory, and the manufacturing establishments controlled by the Board very successful, the accounting arrangements having reached a high standard.

Protest Against Demurrage.—The proposal of the railways to charge $2 per day on all cars at the seaport not unloaded after twenty days will be protested by the Guelph Chamber of Commerce. The matter will come before the Railway Board at an early date. The ground taken by the Chamber of Commerce is that any delay which may occur after the goods are shipped is due to the railway company and not to the shippers.

New Pumps for Guelph.—The Fire, Light and Water Committee have recommended the acceptance of the tenders of the Goldie McCullough Co. for the installation of a 750 gallon pump with a 75 h.p. Crocker Wheeler motor, at $2,904, also a 1,250 gallon pump with 125 h.p. Crocker Wheeler motor for $3,640. The Bawden Pump Co. secured the order for a 2,100 gallon booster pump with 100 h.p. Crocker Wheeler motor for $2,621.

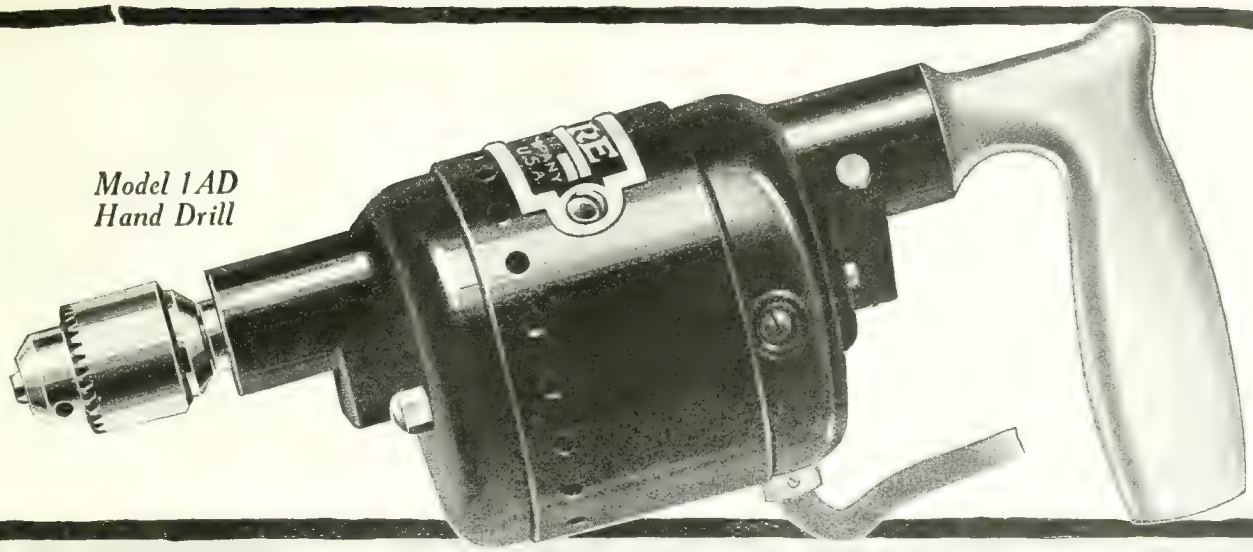
Get Big Contract.—The Vulcan Steel Products Co., of New York, has secured a contract for rebuilding the war swept district of Nancy, at a figure estimated at $250,000,000. It is understood that this figure may be increased to $500,000,000 before the task is finished. Two of the largest contracting firms in the United States are associated with the Vulcan Co. in the contract, the McClintock Marshall Co. and the McArthurs Bros. Co.

New Industry for Collingwood.—The firm of Edwards & Co., industrial brokers of Toronto, have given the Chamber of Commerce a written statement that if they succeed in financing the proposed industry for the manufacture of hard rubber goods, the industry will be located in Collingwood Mr. Duff, of Edwards & Co., is selling stock in the proposed industry in Collingwood and the district.

Trade Commissioner's Visit. — The British Trade Commissioner, Mr. Field, is visiting Sarnia with the object of promoting British overseas trade with local concerns. Samples of German and Austrian goods used in the district before the war will be obtained, and an effort made to get these lines manufactured by British firms will be made. Invitations have been extended to Mr. Field by several of the local manufacturers to visit their plants, and he will be enabled to get in touch with the manufacturing and labor conditions in the district.

Skilled Mechanics Leave. — It is stated by Mr. G. F. Doolan, one of the delegates who interviewed Sir Robert Borden on behalf of the metal trades, that many of the skilled mechanics who are members of the Amalgamated Society of Engineers are booking or have booked their passage to the Old Country. The reason he gives is that the industrial situation in Canada is such as to make it absolutely unattractive, and they have more confidence in the British Government's efforts to ad-

Model 1AD Hand Drill



MODEL 1AD Hand Drill

Length—10 inches.

Weight—4¾ pounds.

Capacity—Steel, brass, aluminum and alloys, 0 to 3/16 inches.

Motor—Universal, operates on either direct or alternating current. Diameter of motor 3⅜ inches.

Spindle—Offset from center 25/32 inches.

Drive—Helical gears.

Handle—Aluminum. Complete with 10 foot cord, plug, switch and chuck. Jacobs chucks used as regular equipment.

MODEL 2AD Sensitive Drill

Height—18 ins. **Weight** 18 lbs.

Stroke—3¼ ins. **Feed**—Rack and pinion. Helical gear drive.

Capacity—Steel, brass aluminum and alloys, 0 to 3/16 inch. Drills to center of 7½ inch piece.

Motor—Universal, operates on either direct or alternating current. **Diameter**—3⅜ inches.

Spindle—Offset from center 25/32 inches.

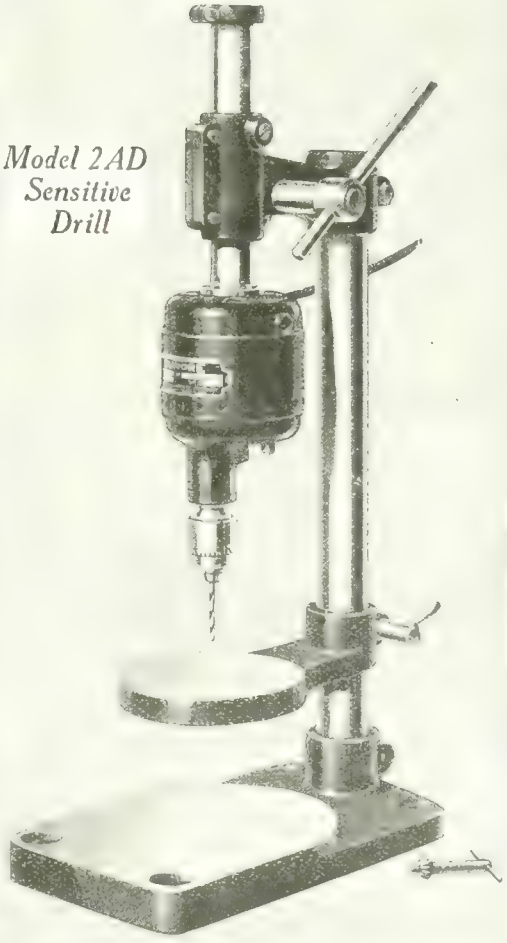
Thrust—Ball bearing.

Table—Adjustable, may be raised, lowered or swung entirely out of the way. Complete with 10 foot cord, plug, switch and chuck. Jacobs chucks used as regular equipment.

Wisconsin Electric Company

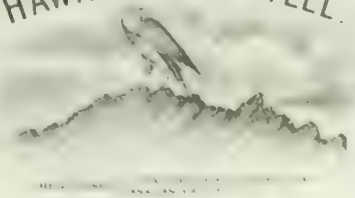
2913 Street Racine, Wisconsin

Model 2AD Sensitive Drill



DUMORE GEARED ELECTRIC DRILLS

"HAWK" BRAND STEEL



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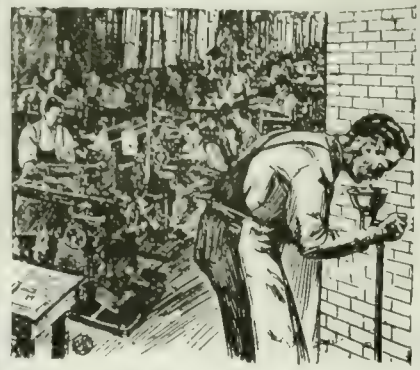
Upon the Health of your employees depends your profit and production



Don't be contented with half-way goodness or makeshift drinking arrangements.

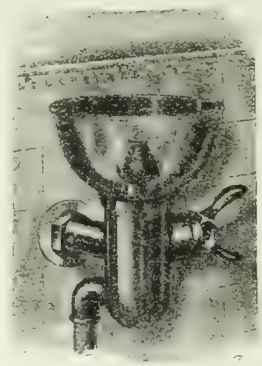
Throw out the germ-laden Drinking Cup!

Give your men a clean drink

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)

Allows just the proper amount of cool, clean fresh water to come through the bubbler. No spurting, overflowing, no loss. "Puro" regulates itself. "Puro" saves 35% on water bills too. You can attach it in a few minutes. Tell us how many men, how many departments and we'll tell you how much the cost will be.



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STATIONARY & PORTABLE KEY WAY CUTTERS
SPECIAL LOCOMOTIVE CYLINDER PLANERS
OFFICE — WORKS: MUSKEGON HEIGHTS U.S.A.

just the industrial situation than those of the authorities at Ottawa.

A Disappointment.—Such little relief as Canadian shippers may have looked for in August by the release of vessels now used as transports for Canadian troops seems likely to be offset. The British Ministry of Shipping is understood to have decided to take 70 per cent. of all cargo space next month, leaving only 30 per cent. for commercial purposes. This is an unpleasant surprise for the Canadian exporters, as this month only 50 per cent. of space had been commandeered for Government purposes and it was hoped this would be lowered to 40 per cent. in another thirty days. This new move will make the Canadian shipping problem, already rather hopeless, almost insoluble if no change is made.

PERSONALS

Corporal William A. Nugent, who served during the war in Company I, 21st Engineers, has returned from France and resumed his duties with the Independent Pneumatic Tool Co. as traveling representative. He has been assigned to his old territory in Indiana.

MARINE

Cleveland.—Artificial fog in the way of smoke from the burning Ontario forests held up the fleet on the lakes from midnight till daylight at the So . Even for some time after the coming of dawn movement was difficult in the hazy atmosphere.

St. Thomas.—The long search for the missing car ferry, "Bessemer," is at last to be abandoned. Capt. Clarke, of Toronto, has supervised the dragging of Lake Erie from end to end, without succeeding in getting any trace of the vessel, although the operations were continued all last year, and up to the present time.

Halifax. — A tern schooner was launched recently from McKean's Shipyard, Tuft's Cove, after being under construction since August last. The hull is constructed of hard pine and Douglas fir. Dimensions are 155 feet overall by 33 feet 2 inches beam by 12 feet depth. She will be rigged as a three-masted fore and aft schooner.

St. John, N.B.—The number of American vessels loading lumber in the port of St. John makes many of the old timers sigh for the good old days of the wooden sailing vessels. These fine ships, owned in Nova Scotia and New Brunswick, carried lumber from St. John and Halifax and other Maritime ports to the United Kingdom, loading thence for the East, and coming home with tea from China or wool from Australia, to reload lumber and repeat the voyage.

Esquimalt. — The Canadian patrol boats, "Armentieres," "Givenchy," and "Thiepval," arrived at Esquimalt recently after a voyage from Halifax, N.S., by way of the West Indies and Panama Canal. The "Stadacona," their flagship, was damaged in a gale off the

coast of Oregon and had to be towed into San Francisco. She sustained the loss of her rudder, and after being repaired will proceed to Esquimalt to rejoin her squadron.

Ottawa.—The present position of the Canadian Government steamers is as follows: The "Canadian Ranger" is at Liverpool. "Canadian Warrior," bound from Cuba to Canada. "Canadian Recruit," bound from Canada to West India and Cuban ports. 'Canadian Voyageur," loading for same ports. "Canadian Volunteer," loading at Victoria, B.C. Two vessels are receiving their finishing touches at Vickers, and three more are expected from Great Lakes yards in the near future.

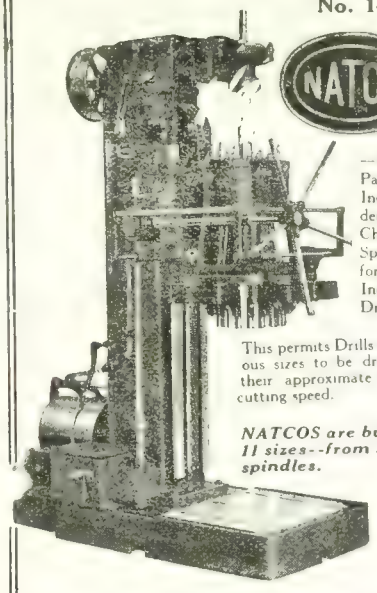
Gore Bay.—Capt. Alexander Cunning, wrecking master of Great Lakes Towing Co., has been successful in his suit against the Erie & Western Railway. This was in connection with the salvage of the steamer "Wissahickon" in 1910, when the vessel was in the hands of the wrecking company. She was looted of property worth $45.000, and Capt. Cunning was accused of complicity in allowing his crew to do the robbing. He was arrested and subsequently released on bond. and in turn brought suit against the E. & W. R. for $50,000. The Chicago court has awarded the Captain $10.000, and completely vindicated him of the charge of complicity.

Vancouver.—The harbor commissioners who were appointed in May, 1913, under the act passed in that year. have been asked by the Minister of Marine to hand in their resignations. A clause in the appointment reads, "During the Minister's pleasure." The reason given for the request for resignation is that the Minister wishes to have a free hand in the expenditure of the $5,000,000 recently voted for harbor improvements. The Board will probably be reconstituted with the same personnel as at present with the inclusion of at least one returned soldier. The present Board consists of F. C. Carter Cotton, chairman; J. A. Fullerton and S. McLay, Board members, and W D. Harvie, secretary.

Montreal.—The Canadian Government Merchant Marine. Ltd., is getting rounded into a fully equipped organization rapidly. A manager for the company has been secured in the person of Mr. R. B. Teakle, with headquarters at the C.N.R. offices on St. James street. Mr. Teakle, who is a Canadian, was associated for a number of years with the Allan Line, and later with the France-Canada S. S. Co. Other members of the staff are Mr. H. Milbourne, marine superintendent, formerly of the Royal Line; Capt. H. E. Webb, traveling marine superintendent; Mr. W. A. Cunningham is export and import freight agent. Another former Allan Line man is Mr. Thos. M. Todd, auditor of the company.

The Haves Wheel Co. have been granted letters patent to increase their capital stock from $200,000 to $1,000,000, the increase to consist of 8,000 shares of $100 each.

No. 14



—with Patented Independent Change of Speed for each Individual Drill.

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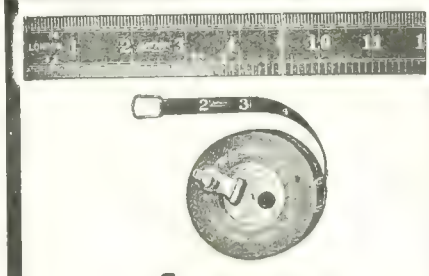

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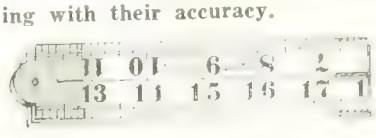

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Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.
Ingersoll-Rand 800 ft. Air Compressor.
1 Tube Mill Fraser & Chalmers 5 x 22
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Also large assortment of Pumps, Tanks, Classifiers, Boilers and Mining Equipment for sale.

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FOR SALE

Used locomotive crane.
Engine—Double-cylinder, 9" x 12" stroke.
Boiler—Vertical, new tubes, hood and smoke-stack, good for 100 lbs. working pressure.
Bucket—¾-yard, boom 58 ft. 6 in. long, wheel base 14 ft., gauge 14 ft.; hoisting and slewing gears in good condition.
All motions operated from one platform.
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For sale, one 35-ton shunting locomotive, complete with trailer, tender, air pump, etc.

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MECHANICAL DRAUGHTSMAN REQUIRED with experience in gasoline engine design. Knowledge of farm machinery desirable. Apply in the first instance with full particulars regarding experience, salary required, etc., with copy of references, to Box 612, Canadian Machinery. (c1m)

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FOR SALE—One used lighting unit, consisting of one 25 K.W., 125 volt, 200 ampere direct current generator to operate at speed of 320 to 350 r.p.m. Generator made by Westinghouse Company. This machine is directly connected with a Goldie & McCulloch 9x10 Ideal engine. This machine can be examined and all particulars obtained at the plant of

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1 Babcock & Wilcox Water Tube Boiler, 100 h. p., 36 in. x 20 ft. 0 in., 4 in. Tubes with complete fittings. Working pressure 150 lbs.

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1 Matheson Feed Water Heater, 3 ft. x 18 in.

1 Stack, 60 ft. x 30 in. x 3-16 in. Steel.

1 Lidgerwood Single Drum Friction Hoist, 10 x 12.-54 in. and extra piston. Corrugated Drums built to carry 1100 ft. 1 in. rope. Load 4,500 lbs. Maximum speed 800 ft. per minute at 100 lbs. pressure. Including Dial Indicator.

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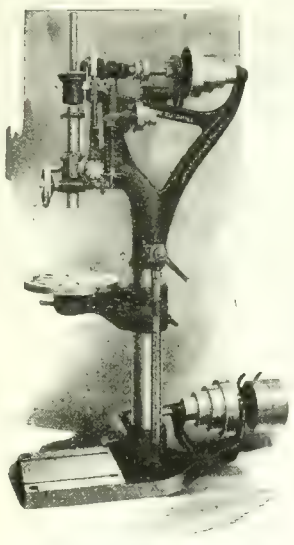

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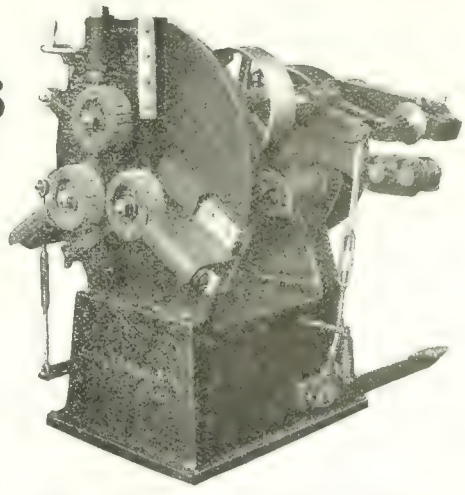

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All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

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Patterns
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BATH Universal Manufacturing Grinders

built by

Universal Grinding Machine Company

Fitchburg, Mass. *U. S. A.*

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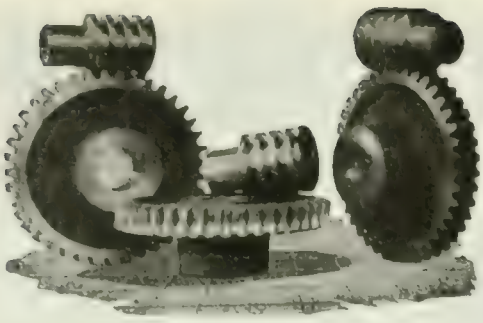
Plain Cylindrical Grinders

Built by

Fitchburg Grinding Machine Co.
FITCHBURG, MASS., U.S.A.



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Hole, Hole and Face and Deep Hole Grinders

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Special Equipment Built to Specification
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Quality and Prompt Service Double-Sure

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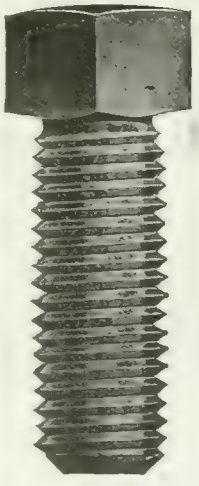

When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

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GALT MACHINE SCREW CO., LIMITED
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Eastern Representatives: The Canadian B. K. Morton Company Limited, 49 Common St., Montreal, Que.

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The REGO 100% Efficient Welding Torch

Saves Oxygen Eliminates Flash-Back Better Welding

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Manufacturers of UNIVERSAL CYLINDER RE-BORING TOOLS.

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Is made of specially treated fire, water and acid-proofed duck material.

Has extra fasteners on sleeves and trouser legs permitting their being tightly fastened around wrist and ankles. **No gaping garments to catch in machinery.**

Designed for service, comfort and protection, outwears regular overalls, extremely strong, comparatively light weight.

An exceptional garment at a reasonable price.

Suits, leggings, gloves, mittens that actually reduce accident hazards. Booklet D-2 shows the complete line of Protexal Clothing manufactured in our own plant.

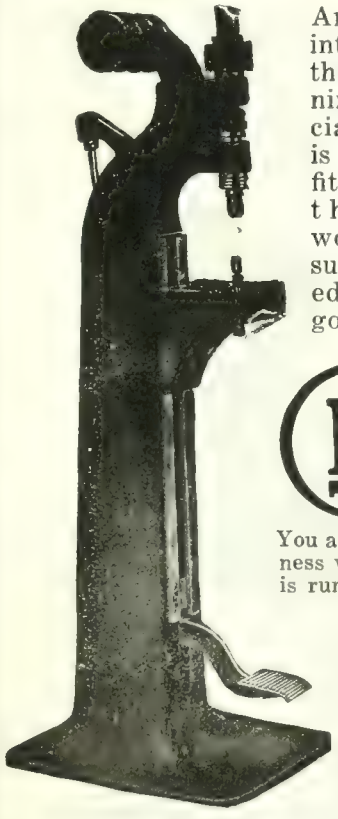
Easiest to put on and take off.

The Strong, Kennard & Nutt Co.

Safety and First Aid Equipment
Makers of Adjustoglas Goggles

2044 E. 9th St. **Cleveland, O.**

No Skill Required



Anybody with ordinary intelligence can operate this Rotary Rivet Spinning Machine. No special skill is required. It is a tool that perfectly fits labor conditions as they exist to-day. A woman can operate as successfully as the skilled mechanic who has gone to the front.

The GRANT is noiseless

You are assured of perfect quietness wherever the **Grant Rotary** is running. And it spins a perfect polished rivet head every second without breaking or marring the casting. Rivets tight or loose. Write for details.

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We take contract work—and turn it out quickly and accurately. We have facilities for:

Drawing
Piercing
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in all kinds of sheet metal. If you have any work of this kind let us quote you prices.

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All the energy of America's most modern machine shop and foundry is concentrated upon one product.

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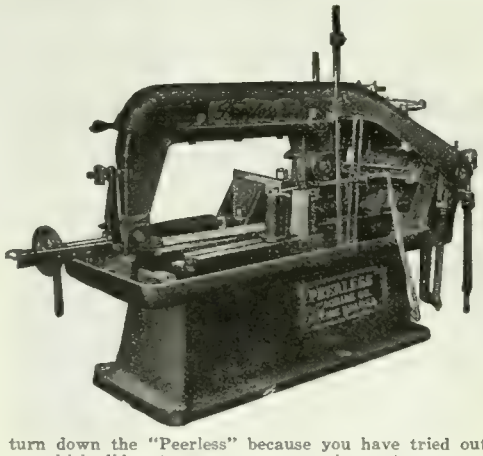
For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

CONSOLIDATED POWER PRESSES

Peerless HIGH SPEED

Has Proven Its Efficiency Where Others Have Failed



DON'T turn down the "Peerless" because you have tried out other hack saws which did not answer your requirements.

Many concerns who were persuaded only with the greatest difficulty to try their first "Peerless," because they "just knew it would turn out like the others," are to-day among the largest and best-satisfied users of our High-Speed Saws.

The "Peerless" is different—and better. It does 50 to 100 per cent. more work, cuts with thinner saws and requires a minimum of attendance, saving time, labor, material, blades and floor space. What is your work? We can tell whether the "Peerless" will do it, and back our judgment with a 30-day trial. If it doesn't make good we pay freight both ways. Well?

PEERLESS MACHINE CO.

1607 RACINE STREET RACINE, WISCONSIN

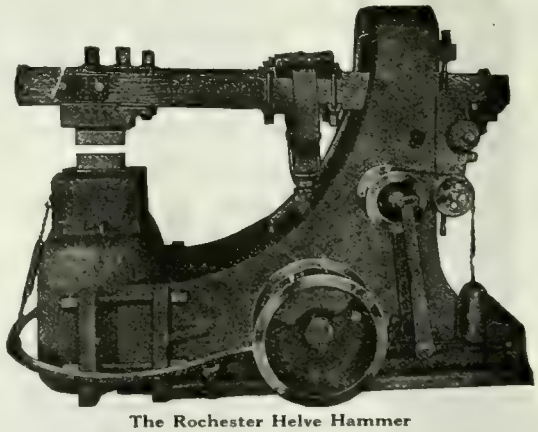
When You're in a Hurry

TO DO THE BEST WORK IN YOUR SHOP IN THE LEAST POSSIBLE TIME

THAT'S INSPIRATION!

WHEN YOU INSTAL A ROCHESTER HELVE HAMMER

THAT'S ACTION!



The Rochester Helve Hammer

It is a well-built, substantial tool for welding and general forging. MADE IN SIX SIZES, 25-lb to 100-lb. Heads and two styles of frame.

Send for our HELVE HAMMER BOOKLET, and give us information regarding character of your work.

WE ARE ALSO MANUFACTURERS OF THE WEST TIRE SETTER? ? ? ? ? ? ?

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Steel, Chrome, Manganese and Nickel Steel Castings

ANNEALED AND UNANNEALED

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Any Size Up to Eighteen Feet Without Patterns

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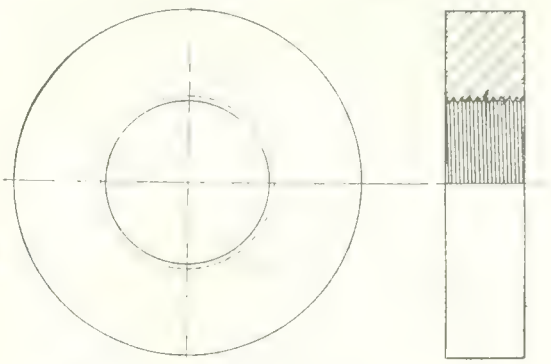
GENERAL THREAD MILLER

Reduces Cost of Production

To the manufacturer who cuts threads in quantities the Smalley-General Thread Miller is urgently recommended. It turns out a larger volume of work in less time than any ordinary machine. Let us prove it! Send us a blue print of what you consider the most difficult thread milling operation in your plant. Or better still, send us samples of the work at our expense for actual test. Our engineering department will give you a time-study and a detailed report of the operation. The test will be fair, practical and convincing. It will prove the ability of the "Smalley" machine on your particular work.

You have everything to gain—take advantage of our offer now.



The Proof in Detail

We herewith give a practical demonstration of the Smalley-General Thread Miller's work:
MACHINE—Smalley-General Thread Miller No. 2. Air collet chuck.
PIECE MILLED—Threaded collar.
THREAD—Diameter 2¾", length 1¼", 8 pitch thread U.S. standard.
LIMITS—.001.
MILLING FEED—25" per minute. Not limit of machine but of hob. Job also faced at same chucking.
MATERIAL—Machinery steel.

Smalley-General Company, Inc., Bay City, Michigan

Canadian Agents—Rudel-Belnap Co., Limited, Montreal and Toronto

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Sheet Metal Working Machinery
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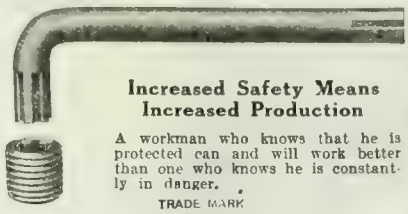
Write for Prices.



Increased Safety Means Increased Production

A workman who knows that he is protected can and will work better than one who knows he is constantly in danger.

TRADE MARK
BRISTO
REG. U.S. PAT. OFF.

SAFETY SET SCREWS

Protect the workman. Free from the need of watching projecting screws which might catch his clothing, he has more time to devote to his work. You yourself will be freed from worry over the safety of your men. And you will be free from law suits, too.
Write for samples and Bulletin 1-809.

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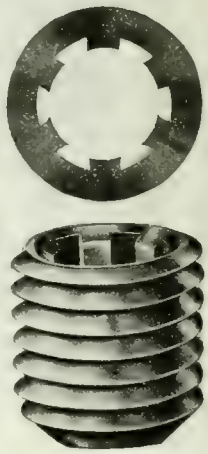

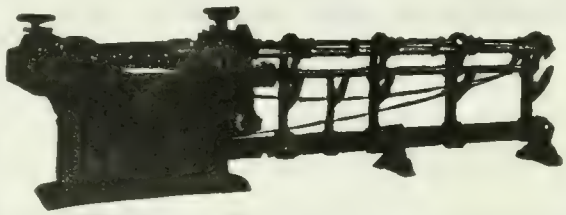

THE WIRE IS PERFECTLY STRAIGHT

and cut to accurate lengths when it comes from our AUTOMATIC WIRE STRAIGHTENING AND CUTTING MACHINE, whether it's ¾" diameter or only .020" wire, hard or soft wire, highly polished or rough stock.

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Formerly John Adt & Son. Established 1866.
Also makers of Riveting Machines, Sprue Cutters, Cotter Pin Machines, etc.

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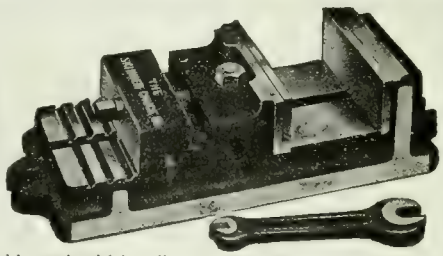

A substantial, durable tool which will pay for itself in short order in any machine shop. Four sizes to accommodate a wide range of work. Try one and you'll buy more.

Printed matter promptly mailed on request.

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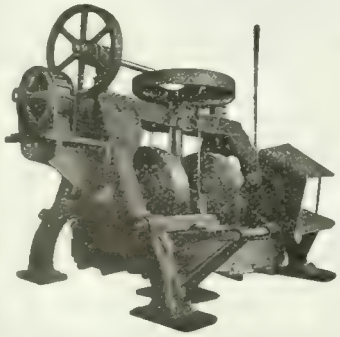

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Unloading Device
Motor or Belt Drive

The Frost Mfg. Co.
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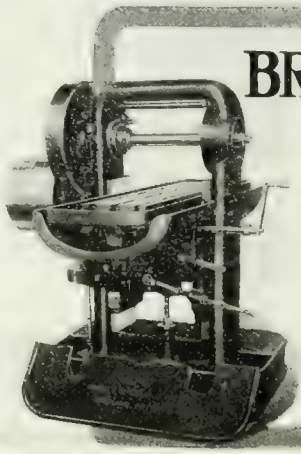

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This Miller is breaking production records wherever introduced. It handles work no other machine of its size can touch and it does perfectly accurate work. Rigid, powerful, accurate.

We should like to show how "Briggs" adaptability and convenience can better output and lower costs for you. Get in touch with us.

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Are made in large sizes for heavy duty

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All Steel---Hardened---All Kinds

FOR SQUARE AND TAPER SHANK DRILLS

Spindle Nut and Screw made of Bar Steel, Body Drop Forged. Long Lasting under hardest use.

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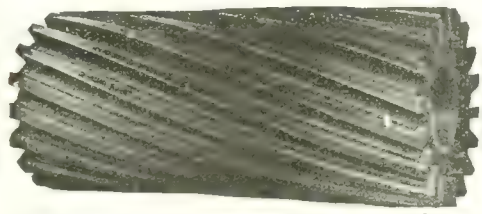
Fast Cutting
Power-ful



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Will outlive and out-cut any other on the market
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A universal grinder. A grinder with all attachments. A grinder that will handle all kinds of tool-sharpening as well as cylindrical, internal and surface grinding. An all-around machine for your tool-room.

Catalog No. 6.

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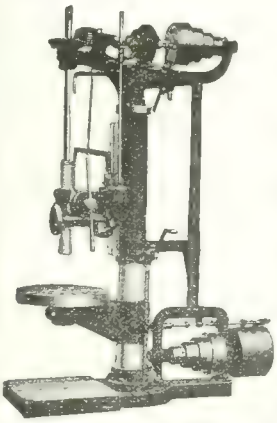

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instantly obtained, are but one of many advantages provided by

SILVER DRILLS

For 64 years these upright Drilling Machines have served well in the States and Canada.

Write for full description of our 20" and 25" sizes.

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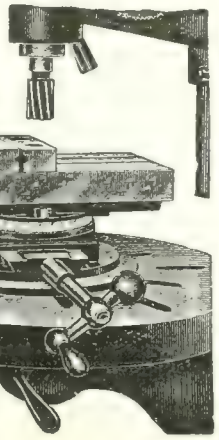
For the Die Maker, Repair Shop, Pattern Maker or Garage; will perform more than 90% of the jobs that come up.



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Electric Travelling Cranes, Hand Cranes, Electric Hoists, Air Hoists, Foundry Equipment, Cupolas, Ladles, etc., etc.

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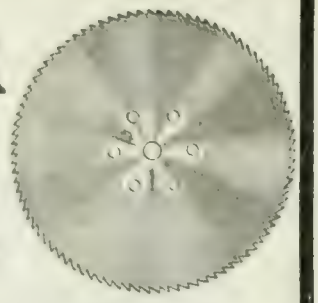
Circular Metal Cutting Saw Blades

For Any Type of Machine



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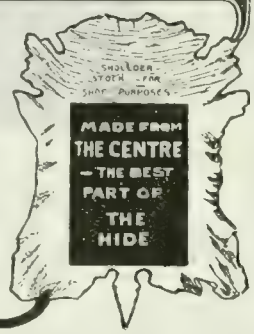

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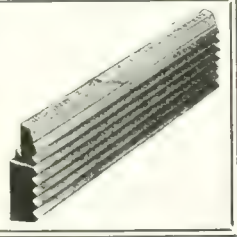

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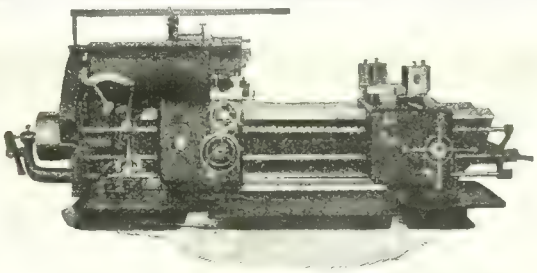

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Tumblers—Large Line.
Burnishing Machines. Grinders.
Special Machines.

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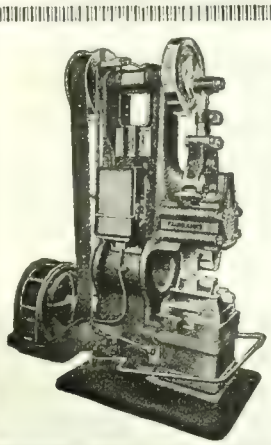

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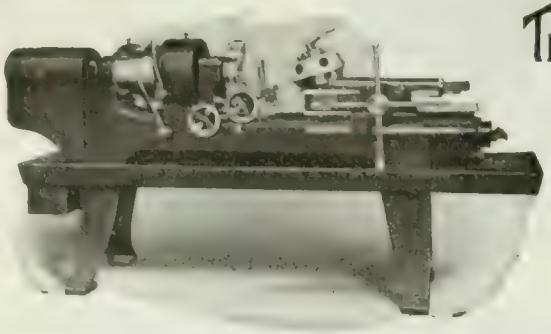

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Made In Twelve Different Sizes

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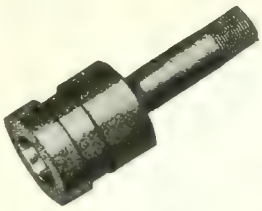

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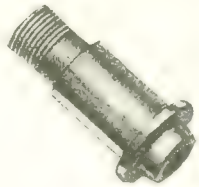

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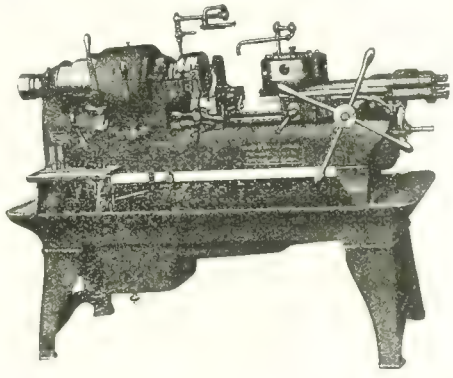

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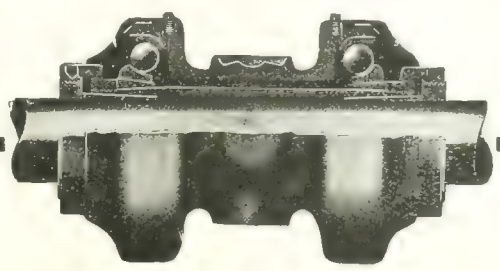

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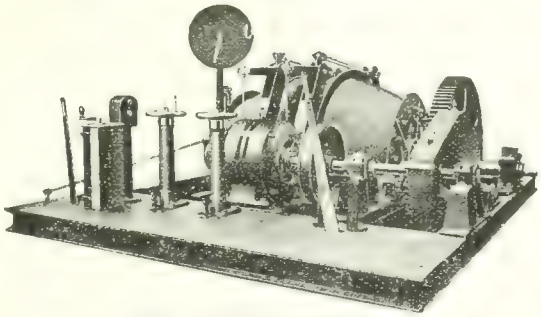

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Canadian Fairbanks-Morse Co., Montreal
The Geo. F. Foss Mchy. & Supply Co., Montreal
Fry's (London), Ltd., London, England.
Garlock-Walker Machinery Co., Toronto, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
United States Electrical Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal, Que

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Cleveland Twist Drill Co., Cleveland.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont
Williams & Wilson, Ltd., Montreal, Que.

ELECTRIC FURNACES
Electric Steel & Metals, Ltd., Welland, Ont.
General Steel Co., Milwaukee, Wis.

ELEVATOR ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton, Ont.

DRILLS, BLACKSMITH AND BIT STOCK
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener, Ont.
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont

DRILLS, CARBON
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll, Ont.

DRILLS, ELECTRIC AND PORTABLE
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Can. Blower & Forge Co., Kitchener, Ont.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
The Geo. F. Foss Mchy. & Supply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
United States Electrical Tool Co., Cincinnati.
A. R. Williams Machinery Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

DRILLS, EMERY
Garlock-Walker Machinery Co., Toronto, Ont.

DRILLS, HIGH SPEED TOOL ROOM
Albany Hardware Spec. Co., Albany, Wis.

DRILLS, HIGH SPEED TWIST
Aikenhead Hardware Co., Toronto, Ont.
Armstrong, Whitworth of Canada, Montreal, Que
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal.
H. A. Drury Co., Montreal.
The Geo. F. Foss Mchy. & Supply Co., Montreal
McKenna Brothers, Pittsburgh, Pa.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
W. F. & John Barnes Co., Rockford, Ill.
Perfect Machine Co., Galt, Ont.
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que
Taylor, J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., St. Catharines, Ont
Wilt Twist Drill Co of Canada, Walkerville, Ont
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal, Que.

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.

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Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati, Ohio
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Machinery Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilt Twist Drill Co. of Canada, Walkerville, Ont

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Cleveland Twist Drill Co., Cleveland.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Canada, Walkerville, Ont.
United Brass & Lead, Ltd., Toronto.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Coventry Chain Co.
Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.

DRIVING TOOLS
The Thos. Pink Co., Ltd., Pembroke, Ont.

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DRYERS, SAND
Pangborn Corporation, Hagerstown, Md.

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Sheldons, Ltd., Galt, Ont.

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Electric Steel & Metals, Ltd., Welland, Ont.

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MacKinnon Steel Co., Sherbrooke, Que.

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DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

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Can. Blower & Forge Co., Kitchener, Ont.
Sheldons, Ltd., Galt, Ont.

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Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
Pratt & Whitney Co., Dundas, Ont.
MacGovern & Co., Montreal, Que.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

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Williams & Wilson, Limited, Montreal, Que.

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Williams & Wilson, Limited, Montreal, Que.

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Canada Emery Wheels Co., Hamilton, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Wheel Trueing Tool Co., Windsor, Ont.

END MILLS
John Morrow Screw & Nut Co., Ingersoll, Ont.

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Johnson Mach. Co., Carlyle, Manchester, Conn.
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Johnson Mach. Co., Carlyle, Manchester, Conn.
Sheldons, Ltd., Galt, Ont.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Oliver Machinery Co., Grand Rapids, Mich.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Ltd., Sherbrooke, Que.

ENGINE SHAFTS
Hammond Steel Co., Inc., Syracuse, N.Y.

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Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch Co., Gananoque, Ont.

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Canadian Fairbanks-Morse Co., Montreal
Sheldons, Ltd., Galt, Ont.

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the Casting Durable

AT 1700° F.
CAST NICHROME
LASTS THOUSANDS
OF HOURS

AT 1700° F.
TENSILE STRENGTH
24,500 LB. PER SQ. IN.

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At a red or white heat, cast Nichrome will bend rather than break. A 20 lb. sledge, repeatedly striking the unsupported centre of a plate of cast Nichrome, ¾ in. thick and heated white hot, will merely cause a gradual bending.

The tensile strength of cast Nichrome is 30% greater at 1500° F. than that ot cast iron at 70° F.

Being exceptionally strong, cast Nichrome heat- treating containers can be made light, afford great conductivity of heat, and requires less time for the completion of the heat treating process.

Nichrome castings are made to endure at high temperatures.

Nichrome castings are extensively used for annealing boxes, carburizing boxes, pots and tubes, and heating retorts.

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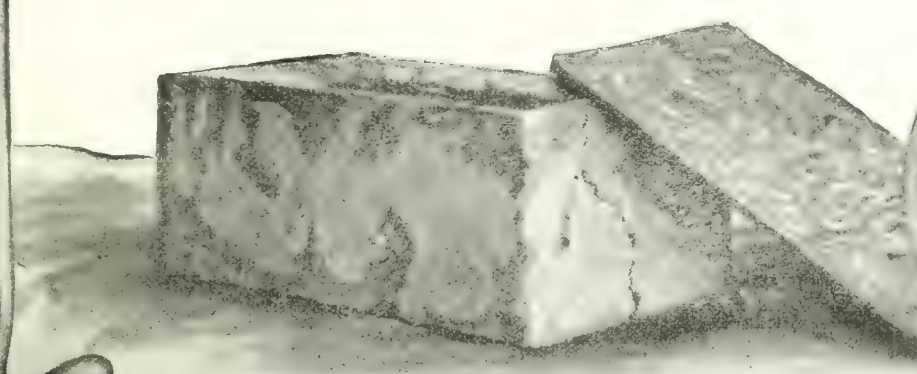

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CAST IRON CRACKS,
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FILES
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Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

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Rice Lewis & Son, Toronto, Ont.
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Steel Co. of Canada, Ltd., Hamilton, Ont.
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Williams & Co., J. H., Brooklyn, N.Y.

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Bliss, E. W., Co., Brooklyn, N.Y.
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Toronto Iron Works, Ltd., Toronto.

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Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, HIGH SPEED STEEL, SHELL
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FURNACES, LEAD AND SALT
Standard Fuel Engineering Co., Detroit, Mich.

FURNACES, RIVETING
Standard Fuel Engineering Co., Detroit, Mich.

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Dom. Forge & Stamping Co., Walkerville, Ont.

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Wells Bros. of Can., Galt, Ont.

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GASKETS, LEATHER, ETC.
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GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, FUSE HOLE
Windsor Mach. & Tool Co., Windsor, Ont.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
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Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Toronto Tool Works, Toronto, Ont.
United Brass & Lead, Ltd., Toronto.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

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Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

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Dom. Foundries & Steel, Ltd., Hamilton, Ont.
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Williams & Co., J. H., Brooklyn, N.Y.

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Williams & Wilson, Ltd., Montreal, Que.

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Bridgeford Mach. Tool Works, Rochester, N.Y.

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Hamilton Gear & Machine Co., Toronto.
Victoria Foundry Co., Ottawa.
Hull Iron & Steel Foundries, Ltd., Hull, Que.
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Norton Grinding Co., Worcester, Mass.
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Modern Tool Co., Erie, Pa.
Norton Grinding Co., Worcester, Mass.
Perfect Machine Co., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis.
The Geo. F. Foss Mchy. & Supply Co., Montreal.
Grant Mfg. & Machine Co., Bridgeport, Conn.
Garlock-Walker Machinery Co., Toronto, Ont.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago, Ill.
United States Electrical Tool Co., Cincinati, O.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.
Wilkinson & Kompass, Hamilton, Ont.

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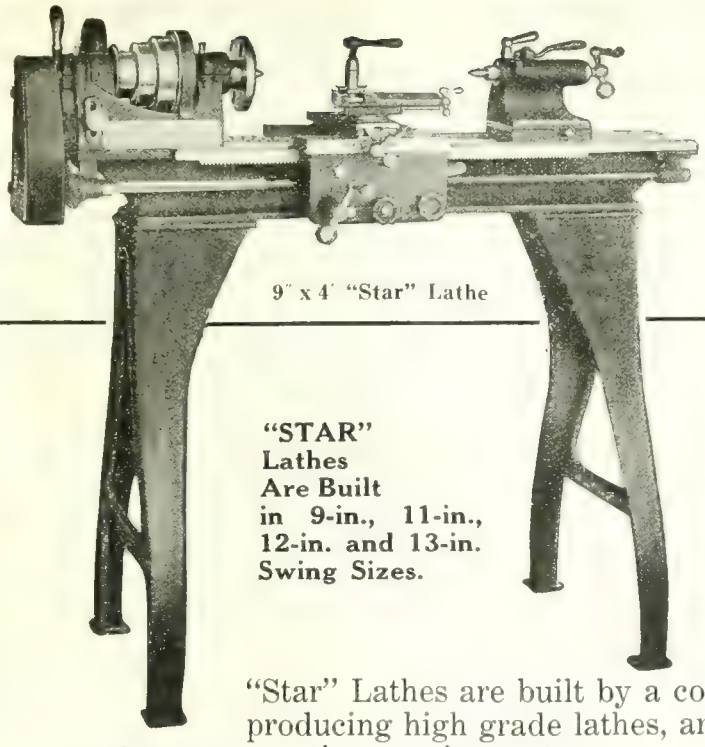
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
MacGovern & Co., Montreal, Que.



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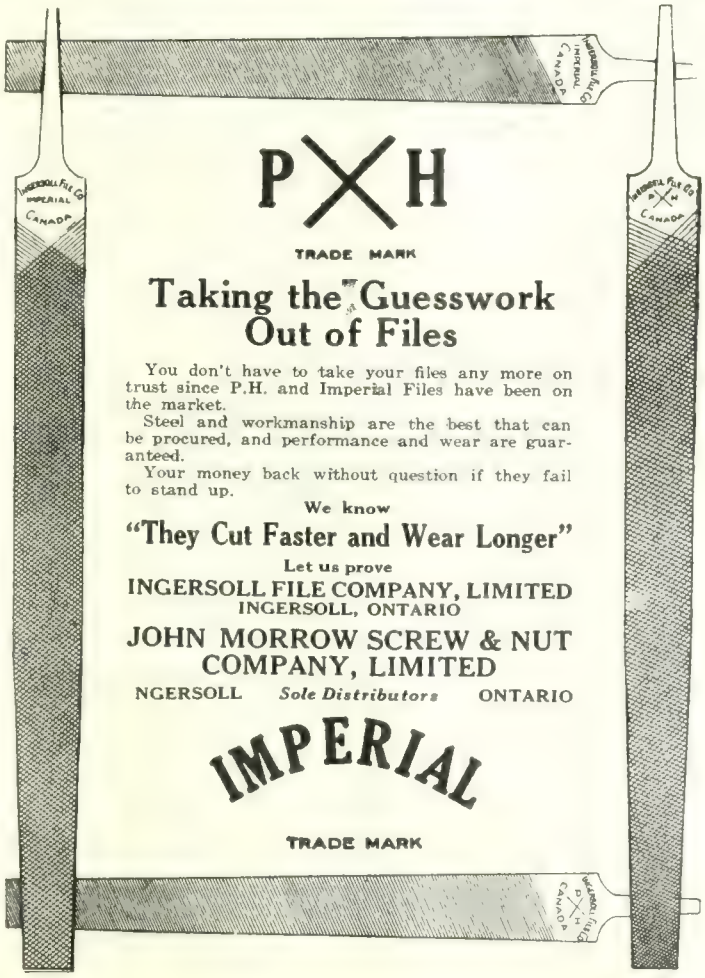

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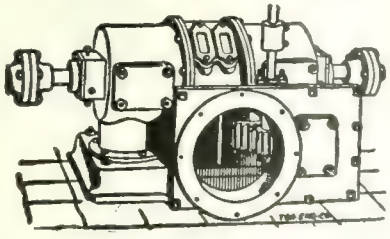

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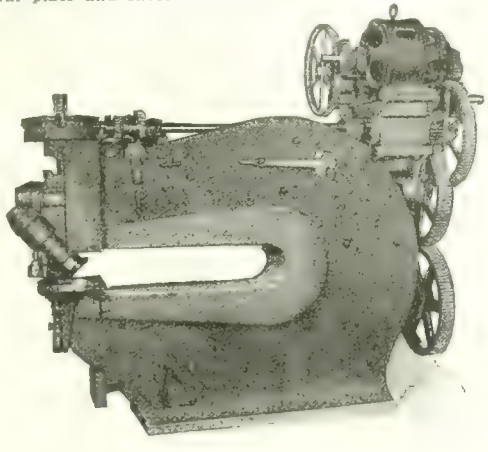

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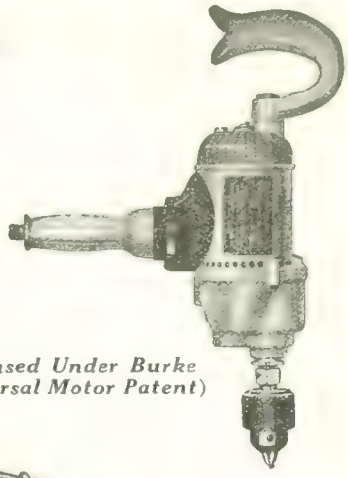

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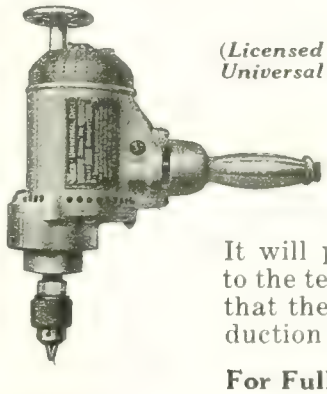

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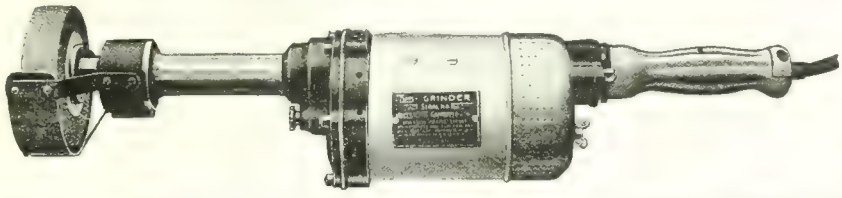

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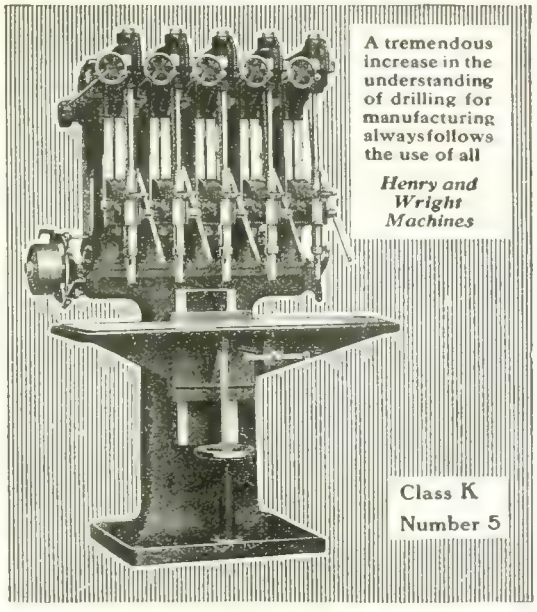

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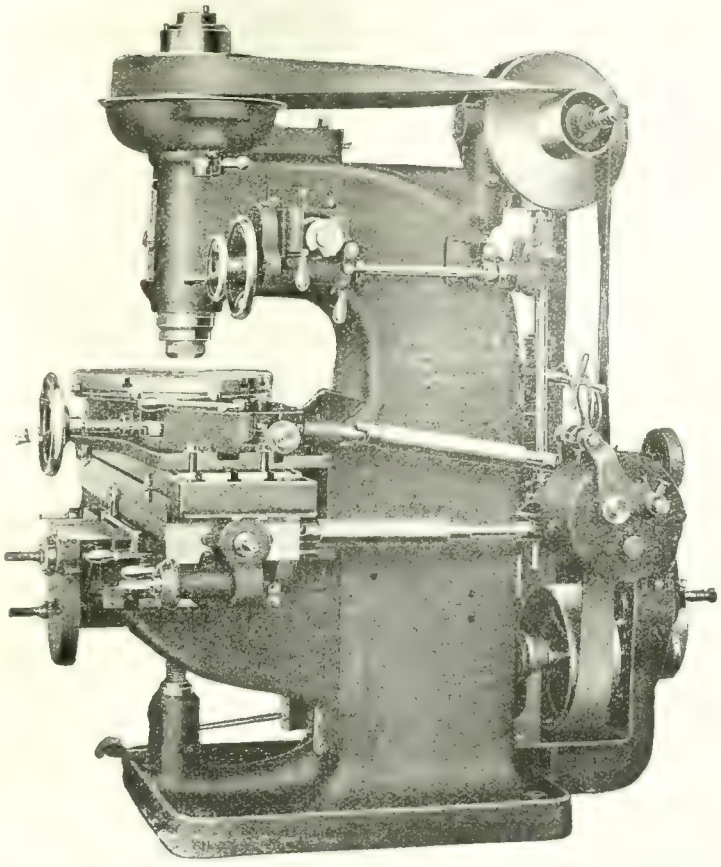

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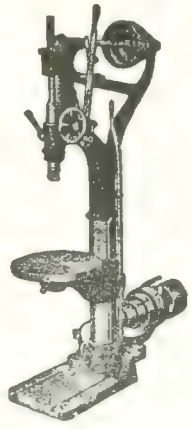

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Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, CAM, TOGGLE, EYELET
Baird Machine Co., Bridgeport, Conn.
Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
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Garlock-Walker Machinery Co., Toronto, Ont.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.

PRESSES, FILTER
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Smalley-General Co., Inc., Bay City, Mich.

PRESSES, PNEUMATIC
Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

PRESSES, DROP AND FORGING
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E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Can. Fairbanks-Morse Co., Montreal.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, HYDRAULIC
John Bertram & Sons Co., Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
William R. Perrin, Ltd., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
West Tire Setter Co., Rochester, N.Y.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
William R. Perrin, Ltd., Toronto.

PRESSES, POWER
Baird Machine Co., Bridgeport, Conn.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Canada.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
William R. Perrin, Ltd., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, SCREW
Barnes, W. F., & John Co., Rockford, Ill.
Bliss Co., E. W., Brooklyn, N.Y.
William R. Perrin, Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Limited, Montreal, Que.

PRODUCTION WORK
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PROPELLERS
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PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

PULLEYS
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American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
Can. Fairbanks-Morse Co., Montreal.
Ford Smith Machine Co., Hamilton, Ont.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Positive Clutch & Pulley Works., Ltd., Toronto.
J. C. Wilson & Co., Belleville, Ont.
Standard Machy. & Supplies, Ltd., Montreal, Que.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PULLEYS, STEEL SASH, STEEL BELT
American Pulley Co., Philadelphia, Pa.

PULLEYS, FRICTION CLUTCH
American Pulley Co., Philadelphia.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Works, Ltd., Toronto
Jones & Glasseo, Montreal.
Johnson, Carlyle, Mach. Co., Manchester, Conn.
Williams & Wilson, Limited, Montreal, Que.

PULLEYS, BELT
American Pulley Co., Philadelphia, Pa.

PULP MILL MACHINERY
MacKinnon Steel Co., Sherbrooke, Que.

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Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Quebec.
M. L. Oberdorfer Brass Co., Syracuse, N.Y.
Pratt & Whitney Co., Dundas, Ont.
Sheldons, Ltd., Galt, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Darling Bros., Ltd., Montreal, Quebec.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
Darling Bros., Ltd., Montreal, Quebec.

PUMPS, HIGH PRESSURE
William R. Perrin, Ltd., Toronto.

PUMPS, ALL KINDS
Darling Bros., Ltd., Montreal, Quebec.
William R. Perrin, Ltd., Toronto.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Darling Bros., Ltd., Montreal, Quebec.
Metalwood Mfg. Co., Detroit, Mich.
William R. Perrin Ltd., Toronto.
Williams & Wilson, Limited, Montreal, Que.

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PUMPS, HAND, FOR OIL AND GASOLINE
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

PUMPS, RUBBER CEMENT
Bowser & Co., S. F., Inc., Fort Wayne, Ind.

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Can. Blower & Forge Co., Kitchener, Ont.
Can Fairbanks-Morse Co., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Marshall, Son & Bunney, Toronto.
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Marten Machine Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
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Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto, Ont.
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Stoll Co., D. H., Buffalo, N.Y.
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Williams & Wilson, Limited, Montreal, Que.

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Taylor Instrument Co., Rochester, N.Y.

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Niles-Bement-Pond Co., New York.

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Garlock-Walker Machinery Co., Toronto, Ont.
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Williams & Wilson, Limited, Montreal, Que.

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Marshall, Son & Bunney, Toronto.
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Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., St. Catharines, Ont.
Wilt Twist Drill Co., Walkerville, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Kelly Reamer Co., Cleveland, O.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
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Butterfield & Co., Rock Island, Que.
Can. Fairbanks-Morse Co., Montreal.
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Cleveland Twist Drill Co., Cleveland.
Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Can. Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Illinois Tool Works, Chicago, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.

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Wells Bros. of Can., Galt, Ont.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Greenfield Tap & Die Corp., Greenfield, Mass.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, HAND
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, EXPANDING
Greenfield Tap & Die Corp., Greenfield, Mass.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, PIN
Greenfield Tap & Die Corp., Greenfield, Mass.
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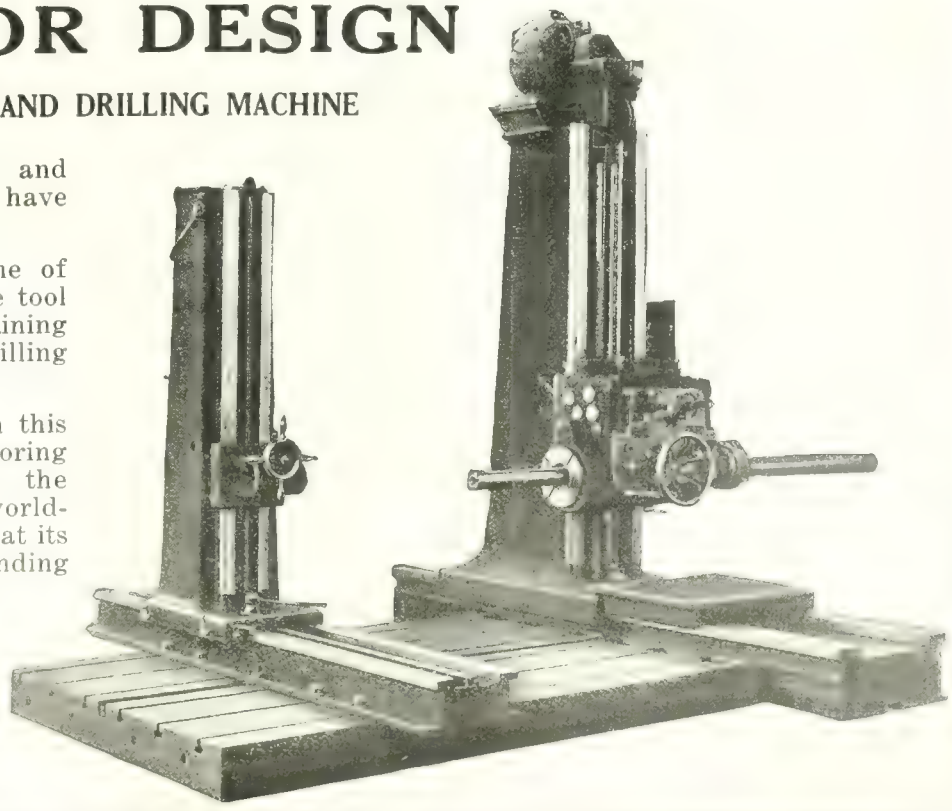

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Morrow Screw & Nut Co., John, Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

REAMERS, JOBBERS
John Morrow Screw & Nut Co., Ingersoll, Ont.

REAMERS, PIPE, SHELL
Greenfield Tap & Die Corp., Greenfield, Mass.
John Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

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REGULATORS, PRESSURE TEMPERATURE
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Taylor Instrument Co., Rochester, N.Y.

RESPIRATORS
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Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.

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Rice, Lewis & Son, Toronto, Ont.
Steel Co. of Canada Ltd., Hamilton, Ont.

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Can. Ingersoll-Rand Co., Montreal.
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Garlock-Walker Machinery Co., Toronto, Ont.
Independent Pneumatic Tool Co., Chicago, Ill.
Niles-Bement-Pond Co., New York.

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High-Speed Hammer Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal, Que.
F. B. Shuster Co., New Haven, Conn.

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Page Steel & Wire Co., Adrian, Mich.

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Garlock-Walker Machinery Co., Toronto, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Limited, Montreal, Que.

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ROPE, TILLER AND SASH CORD
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Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor, Ont.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor, Ont.

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Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson, Limited, Montreal, Que.

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Strong, Kennard & Nutt Co., Cleveland, Ohio.

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SAND BLAST SUPPLIES AND ACCESSORIES
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SAFETY APPLIANCE GOGGLES
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Canada Machinery Corp., Galt, Ont.
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Marshall, Son & Bunney, Toronto.
Plewes, Ltd., Winnipeg, Man.
Simonds Mfg. Co., Fitchburg, Mass.
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Wells Bros. of Can., Galt, Ont.

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SCLEROSCOPES
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Morrow Screw & Nut Co., John, Ingersoll, Ont.
United Brass & Lead, Ltd., Toronto.

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Garlock-Walker Machy. Co., Ltd., Toronto, Ont.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield, Mass.
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National Acme Co., Cleveland, Ohio
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. of Can., Galt, Ont.
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A. R. Williams Machy. Co., Toronto.
Wood Turret Mach. Co., Brazil, Ind., U.S.A.
Williams & Wilson, Ltd., Montreal, Que.

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Morrow Screw & Nut Co., John, Ingersoll, Ont.
National Acme Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Steel Co. of Canada, Ltd., Hamilton, Ont.
United Brass & Lead Ltd., Toronto.
Wilkinson & Kompass, Hamilton, Ont.

SCREWS, COLLAR
John Morrow Screw & Nut Co., Ingersoll, Ont.

SCREW COLLARS
Morrow Screw & Nut Co., Ltd., John, Ingersoll.

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Morse Twist Drill & Mch. Co., New Bedford, Mass
Rice Lewis & Son, Toronto, Ont.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Wilkinson & Kompass, Hamilton, Ont.

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National Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.

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SCREWS, SET, MILLED AND HEADLESS
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SCREWS, MACHINE, CAP AND SPECIAL
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SCREWS SAFETY, SET AND HOLLOW SET
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Wilkinson & Kompass, Hamilton, Ont.

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Garlock-Walker Machinery Co., Toronto, Ont.
Hendey Machine Co., Torrington, Conn.
Hamilton Mach. Tool Co., Hamilton, Ohio.
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Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton, Ont.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
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Bertrams, Ltd., Edinburgh, Scotland
Canada Machinery Corp., Galt, Ont.
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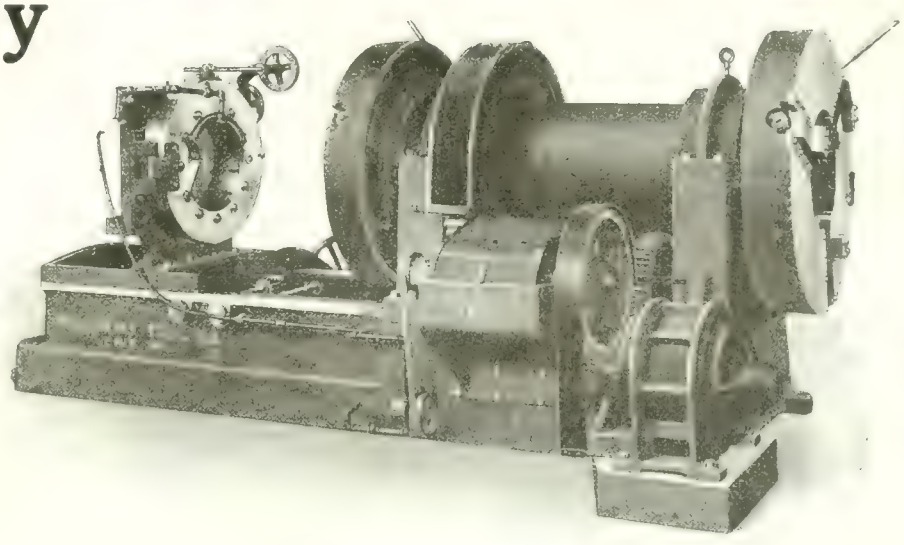

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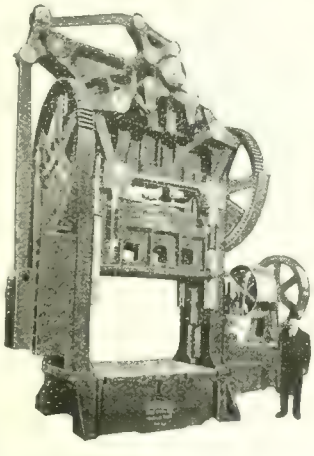

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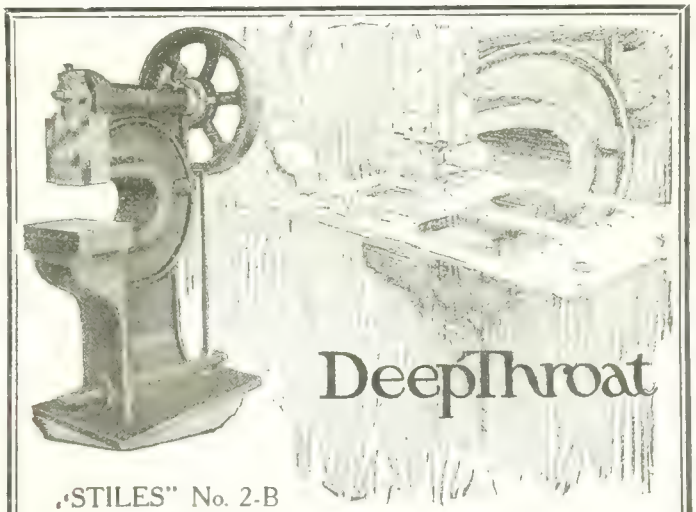

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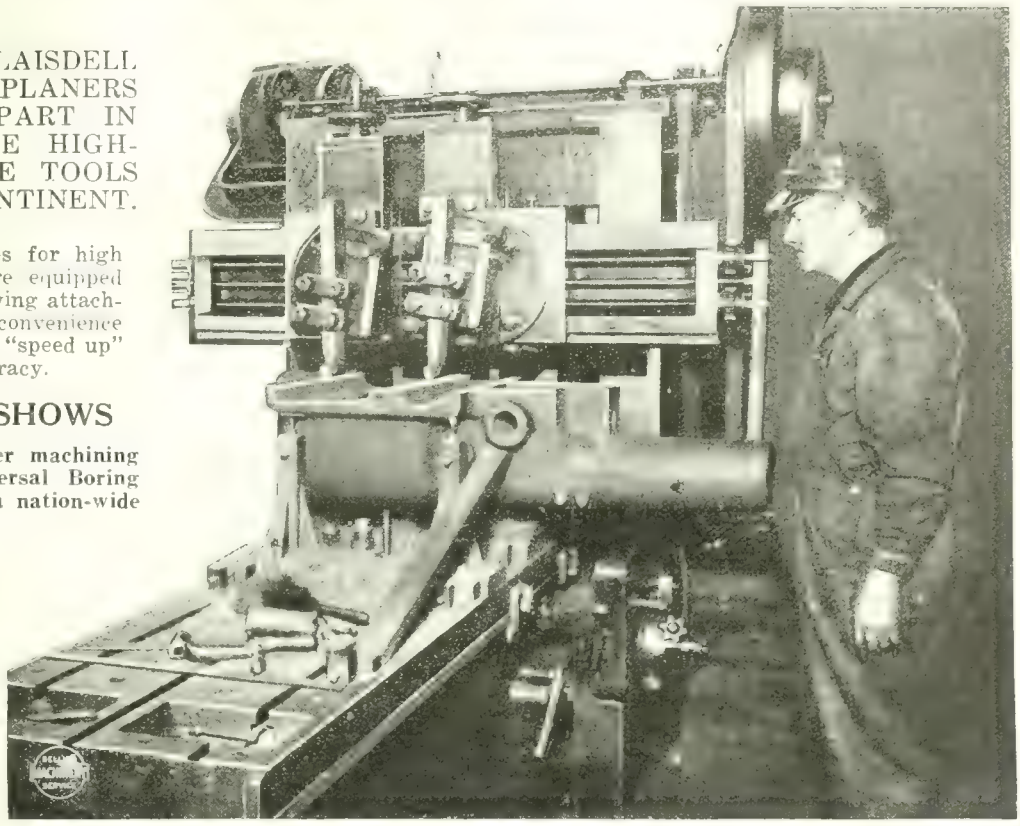

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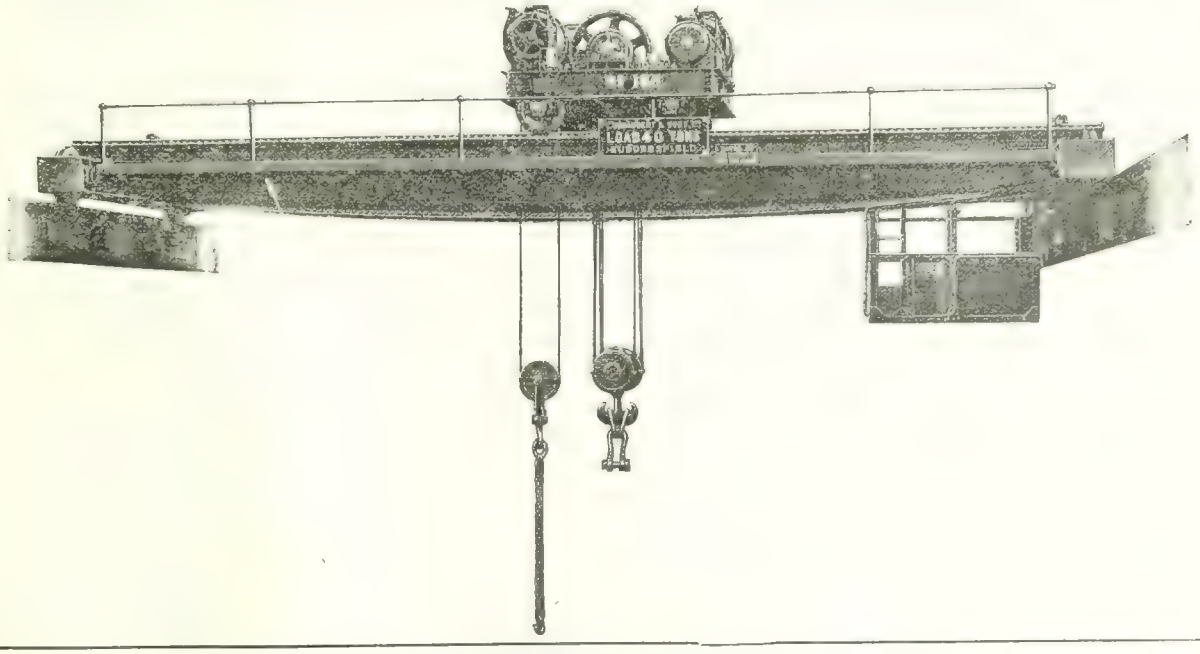

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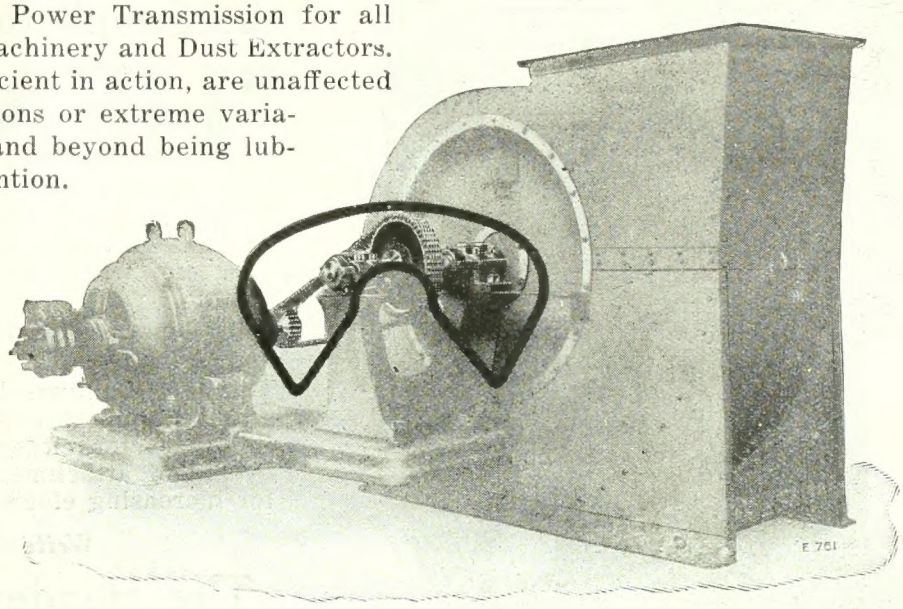

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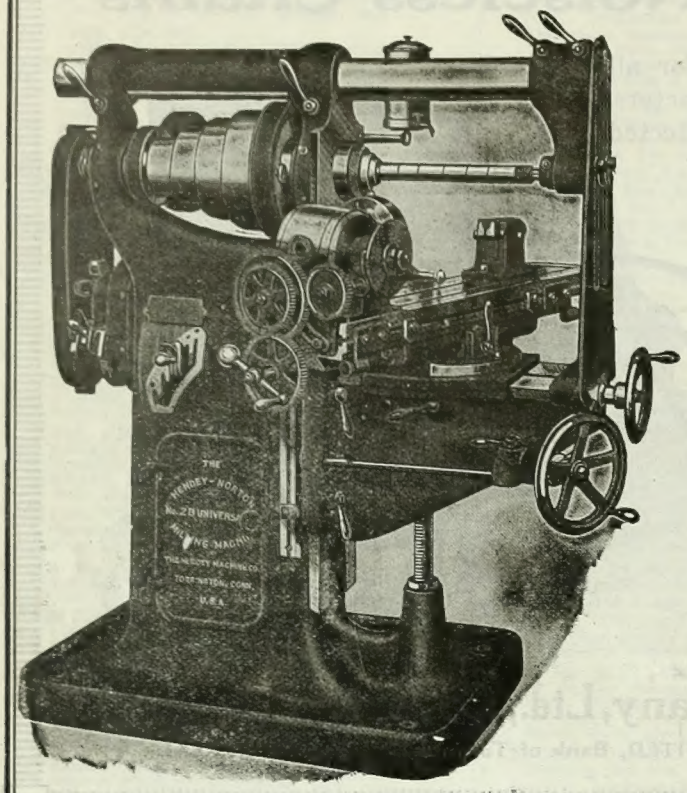

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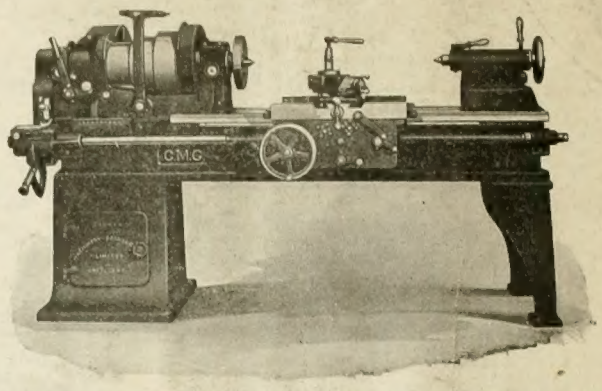
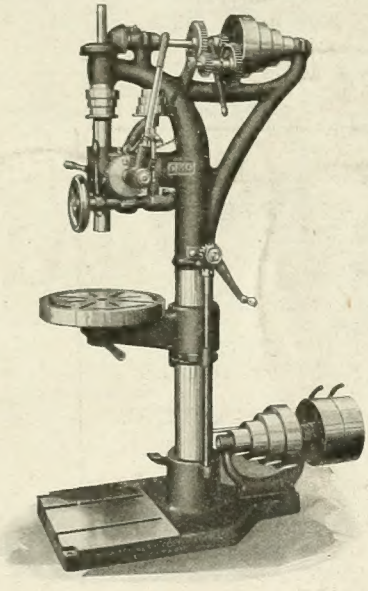
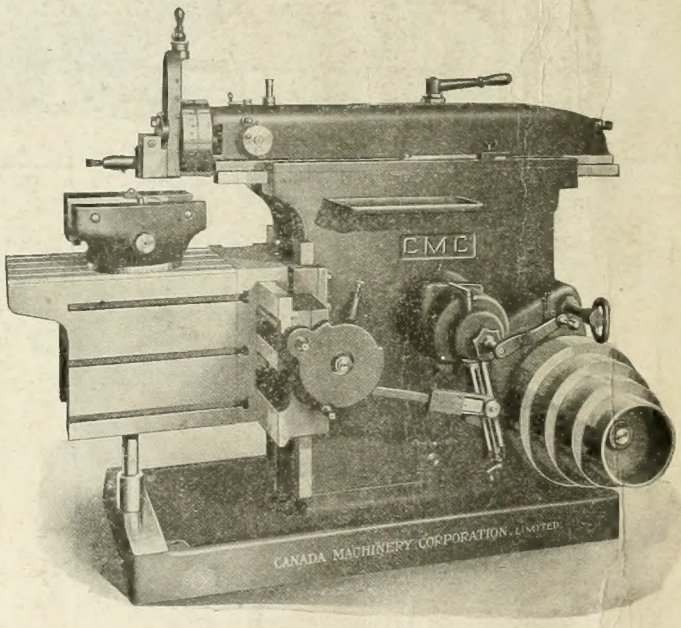


16 in. Lathe with Quick Change Gears



20 in. Power Feed Drill



20 in. x 22 in. Shaper

We manufacture also a complete line of heavier machine tools.

CANADA MACHINERY CORPORATION, LIMITED, GALT, ONTARIO

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